McGRAW-HILL INTERNATIONAL

Management Digest

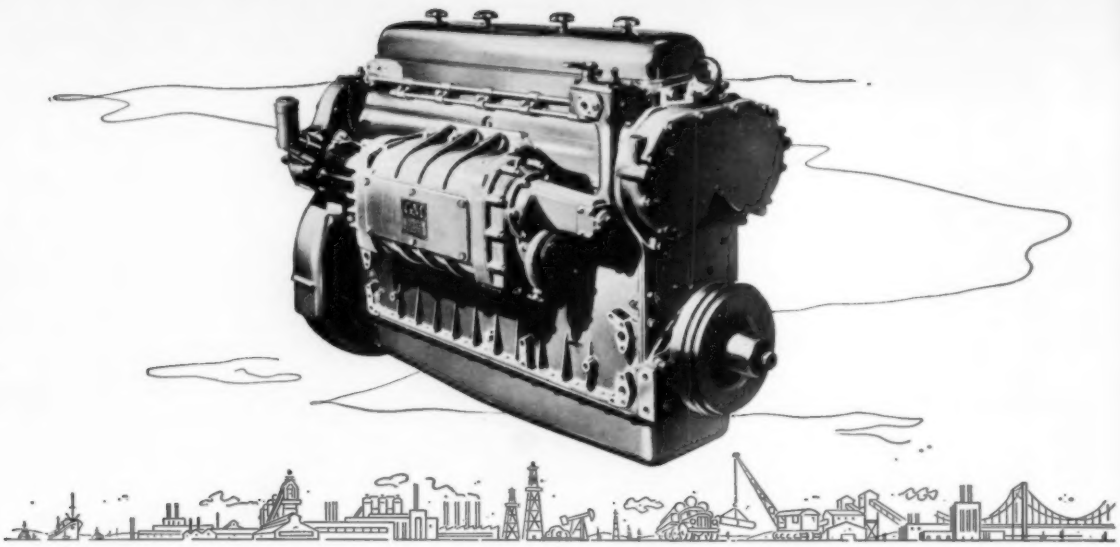
TECHNICAL • INDUSTRIAL • COMMERCIAL

FEBRUARY 1956

OVERSEAS EDITION

New Buildings, Busy People . . .

Symbols of Tokyo's Drive for Trade Leadership—p11



The power of economy

GM Diesel engines power more different kinds of equipment than any other make. You'll find them hard at work as original or replacement power plants in more than 750 models of construction, mining, drilling, generating and marine equipment built by over 150 manufacturers. And whatever the job—big or small—these dependable Diesels are setting new records for economy.

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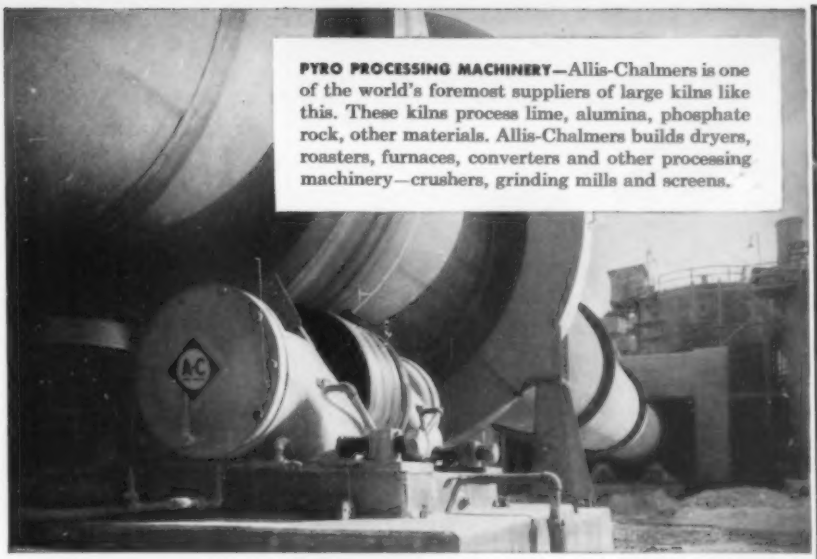

PYRO PROCESSING MACHINERY—Allis-Chalmers is one of the world's foremost suppliers of large kilns like this. These kilns process lime, alumina, phosphate rock, other materials. Allis-Chalmers builds dryers, roasters, furnaces, converters and other processing machinery—crushers, grinding mills and screens.

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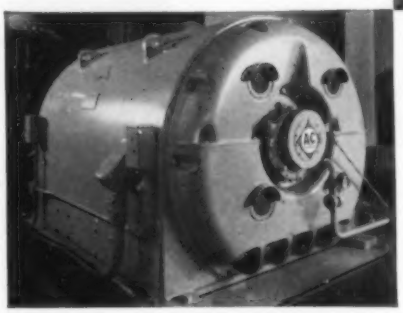
By creating new products, new materials, new processes, the world's chemical industries contribute to the health, comfort and prosperity of people everywhere. Processing machinery and electrical equipment built by Allis-Chalmers are helping these important industries increase production and lower costs. Here are some examples:

PROCESS PUMPS—This unit has been pumping corrosive and abrasive liquids 24 hours a day, 7 days a week for over 2 years—yet has never shut down for maintenance. This outstanding performance is indicative of why Allis-Chalmers liquids and solids handling pumps are in wide use throughout the chemical industry.



ELECTRICAL EQUIPMENT—This 3000-hp motor drives the main blower in a catalytic cracking plant. In addition to motors, Allis-Chalmers can supply a complete system for power generation, distribution and utilization—everything from turbines to switchgear and motor control.

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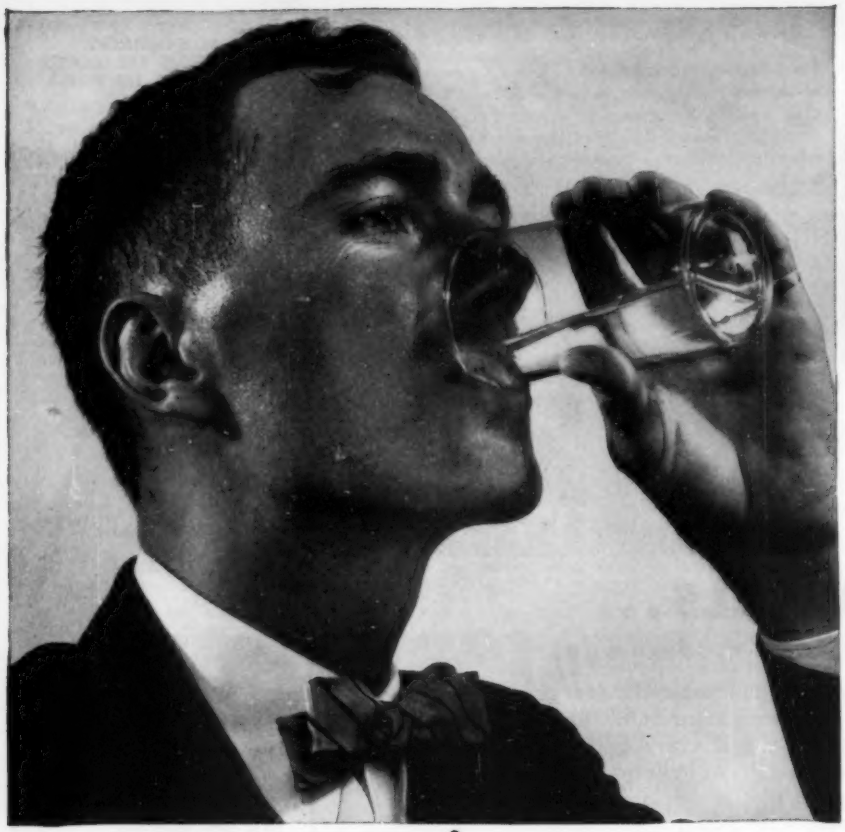


Ever taste the glass?

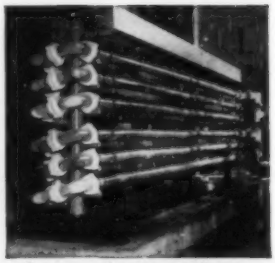
How often a glass of cold water just hits the spot!

Ever stop to think of *why the glass?* Is it because the drink looks sparkling cold and inviting through its crystal transparency? Or glass is so smooth to touch and light to pick up? Or because it's easy to clean?

These things are important, but mostly it's because your drink tastes better. The drink doesn't pick up the taste of the container. Glass is chemically stable. Non-contaminating.

That's why dairymen use glass pipelines; why processors of food, pharmaceuticals, dyes and other sensitive chemicals use so much glass equipment. It's also one reason for glass cooking ware and coffeemakers.

Glass offers a remarkable combination of properties that may make it useful to you—its controlled light transmission, for example—besides its chemical stability. Or its heat resistance and unique electrical characteristics. You'll find some interesting information about glass and its applications in our new edition of *"Glass and You."* Send for a copy today.



Sensitive pharmaceuticals are processed quickly and safely in this Corning brand glass cascade cooler. The chemical stability of the glass protects the product. Its corrosion resistance assures long service life, permits the use of low-cost river and sea water as coolant.

Coffee never tastes so good as when it's made in glass coffeemakers. You taste nothing but the coffee itself . . . no metallic after-taste.

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Your Worthwhile Reading for February 1956:

WORLD BUSINESS

Tokyo: Asia's New Trade Center?..... 11
Iran's Oil Flows Again..... 13
Latin America: Its Architecture Is Its Own..... 14
Electronic Banking Is Cheaper..... 16

MANAGEMENT METHODS

Automation: Will It Hurt Small Business?..... 17
"Brainstorming" Method Develops New Ideas..... 18
Where You Can Use the Older Worker..... 19
Handling Plan Avoids Future Problems..... 20
Profit Result Better When "Insiders" Direct Company..... 21
Plan Safety During Plant Design..... 22

NEW PRODUCTION TECHNIQUES

Plastics Push Toward New Peaks..... 23
Maybe You Can Use Faster Machines..... 26
New Ways to Raise Steel Capacity..... 27
One-Coat Enameling 28
One Man Runs Production Line..... 33
New Tower Handles Three Process Steps..... 34

MARKETING

Retail Selling Headed for Change..... 35
"Consumerism" Concept Welcomed in Far East..... 37

CONSTRUCTION

New Ideas Hold Builders' Interest..... 38

ENGINEERING

How to Specify Zinc Coatings..... 40
Radiation Tool for Chemical Processing..... 41

TRANSPORTATION

Europe's Cars Show Advanced Styles..... 42
New Low-Cost Auto Aims at Europe's Market..... 43

FINANCE

Growth Stocks for Long-Term Security..... 45
Financial Digest 46
Dividends Down in '56..... 46

PLUS . . .

World Trends 7
You 34
Product Digest 48
Management Reading... 57

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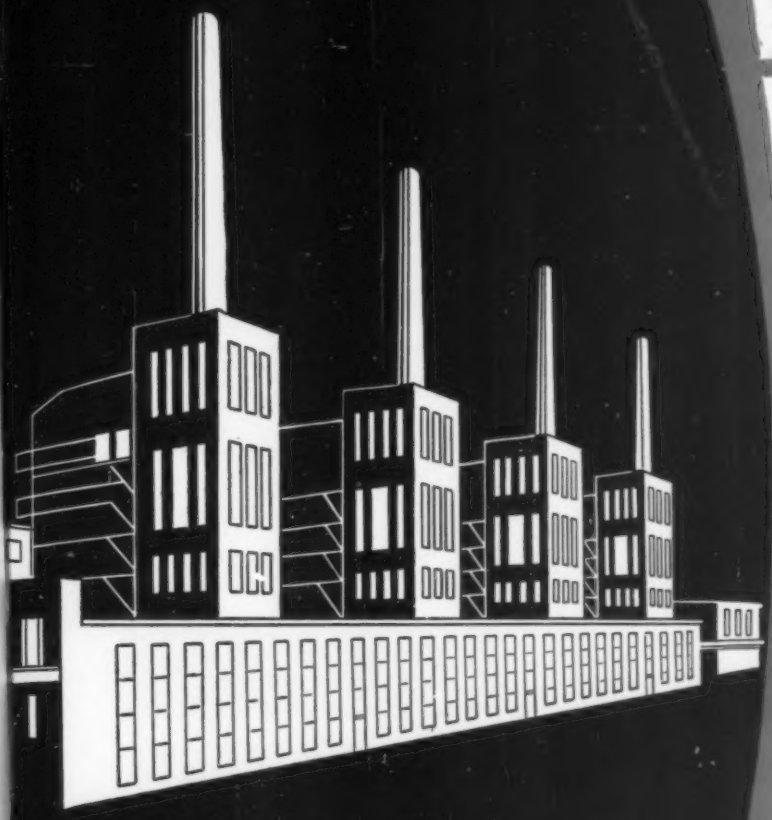

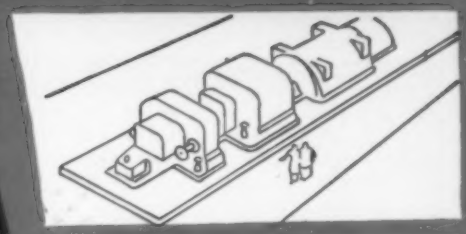

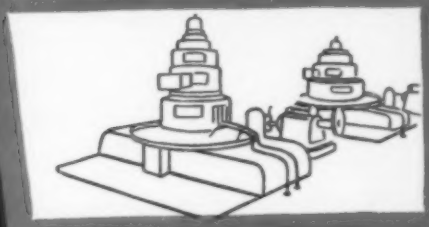

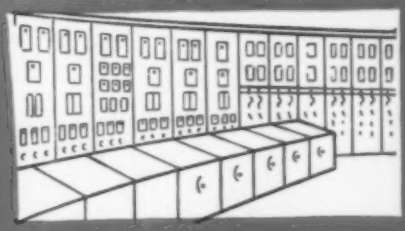

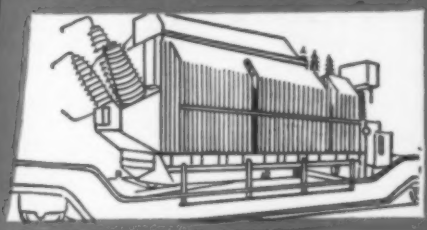

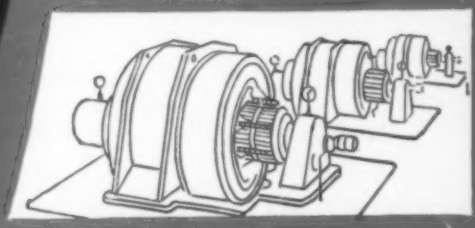

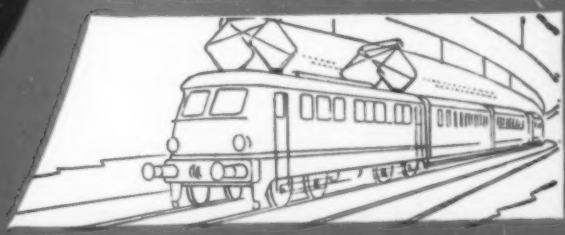

The World's electric power consumption continues to double every six or seven years and the World's industries largely depend upon electrical resources to sustain their constant growth.

For very many years the AEG has excelled in the planning and construction of large-size electrical installations as is evidenced by the numerous generating stations up to the highest capacities, transmission and distribution systems, for traffic and industries in almost every quarter of the World.

Avail yourself also of the capacity and experience at the disposal of the AEG.

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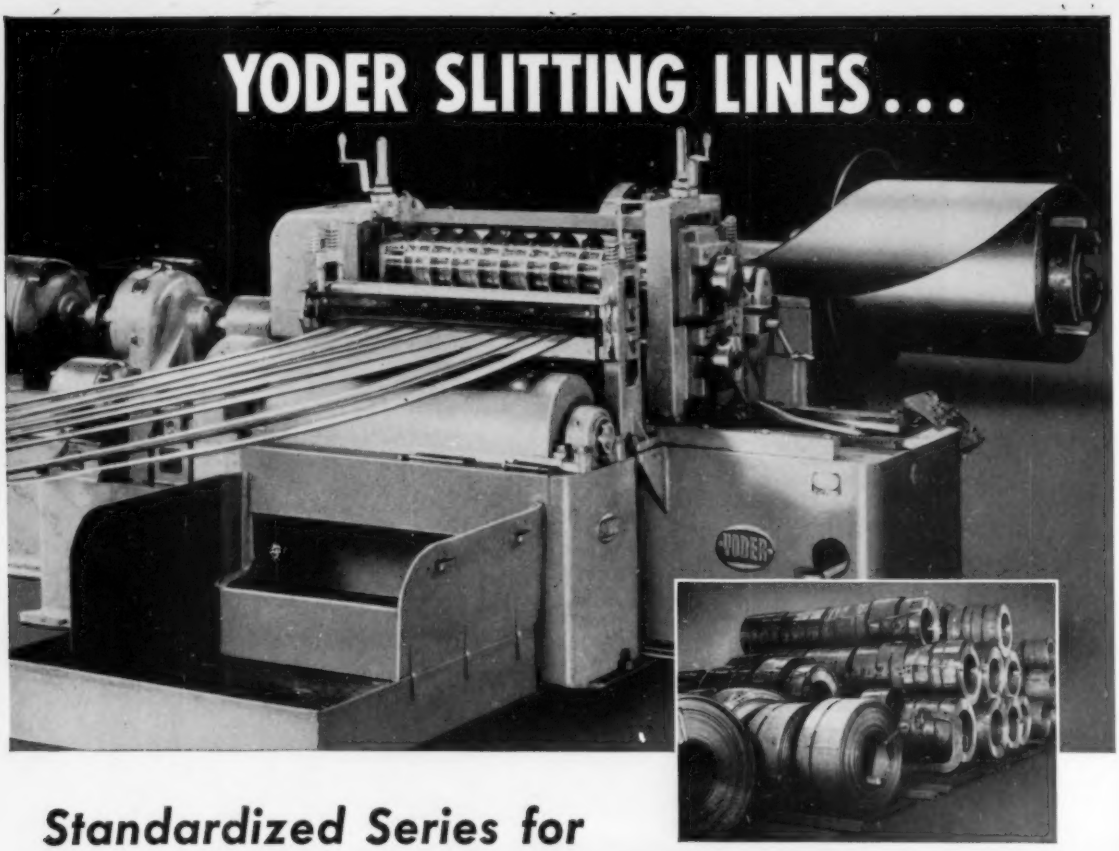
YODER SLITTING LINES...



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LOW FIRST COST AND OPERATING COST!

A relatively small, low-cost Yoder slitting line offers attractive savings possibilities and high production in slitting small and medium coil sizes and strip gauges. Yoder has standardized a series of such machines, affording a rare combination of low cost and productive capacity amply sufficient for the needs of the great majority of sheet metal fabricators and custom slitting shops. Supplementing the standardized series are *special models for slitting big coils and heavy gauges at high speeds.*

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Yoder Slitter Book contains basic information on the economics and mechanics of slitter operation, with time and cost studies, production records and other valuable data. Send for it.

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ENGINEERING YODER MANUFACTURING

ROTARY SLITTING LINES

COLD ROLL FORMING MACHINES

ELECTRIC-WELD PIPE AND TUBE MILLS

▶ WORLD TRENDS

FRANCE . . .

The economy seems headed toward economic isolation. Businessmen throughout Western Europe are curious, concerned. They see France standing apart—failing to adapt to international economic trends, failing to liberalize foreign trade.

Internally the economy looks prosperous. Indeed, industrial production was up about 10% in '55. But externally performance is poor. French manufactured goods offer little real competition in foreign markets. The balance of trade with the dollar area has not improved. The future is uncertain, at best.

Highly restrictive trade and monetary controls are a glass crutch upon which France is leaning too heavily, say observers.

CANADA . . .

Widespread prosperity and industrial gains will continue. Last year was Canada's biggest. Total value of goods and services topped $26-billion, a 9% increase over '54. In the year ahead, look for greater production, greater capital spending, continued heavy buying abroad. Lending practices may be tightened a bit.

Future trade policy should benefit British sellers at the expense of U. S. companies. Canadian businessmen are pointing to a widening trade deficit with the U. S. and a widening surplus with Britain. They insist that Canada buy more from across the Atlantic, less from the U. S. British trade officials approve—heartily.

UNITED STATES . . .

Overseas trade of U. S. will reach a new peak in '56. Non-military exports and imports will total $25-billion. Imports will gain 3%—will top $11.3-billion. Exports will amount to $14-billion.

U. S. sales to Western Europe will drop about 3% because of rising inflation in European nations. Governments will be curbing imports and boosting their own exports. Greater U. S. sales in Latin America will offset the drop in Europe.

LATIN AMERICA . . .

The economic barometer now reads: general outlook favorable for all of '56—but with local overcast in some central and southern areas.

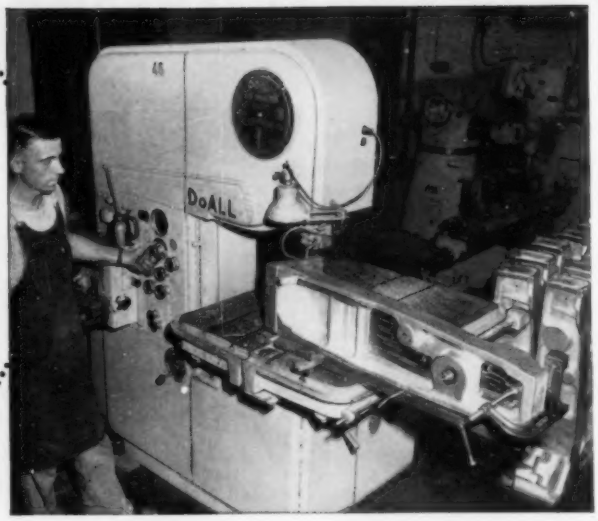
Argentina: Recent currency devaluations will have favorable effects. Austerity and caution, however, will be the watchwords this year. **Brazil:** Big worry will be the coffee surplus. Over-all, business and trade look promising. More development loans are on the way. **Chile:** Copper quotations will remain firm. The peso will gain strength. Revenues from copper should exceed $160-million.

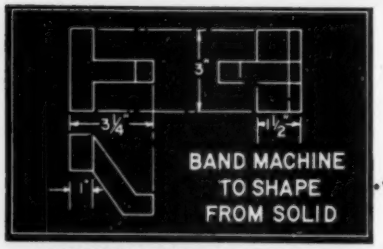
Colombia: Heavy world coffee supplies will be a big problem this year. Exchange and debt troubles will darken the picture. One bright spot will be foreign private investment. **Peru:** Currency will strengthen. Investment climate will remain most attractive. **Venezuela:** The forecast: good, especially for the oil industry. American and European imports will expand.

Cut Operating Costs with a DoALL

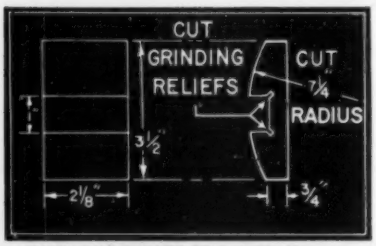
CONTOUR-MATIC

BAND MACHINE...

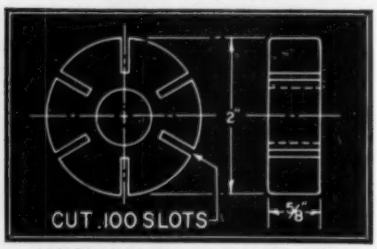




46.28 HOURS SAVED cutting mounting bracket from solid. 75 pieces formerly shaped in 60.00 hours, now band machined in 1.35 hours.



56% TIME SAVING in machining radius and grinding reliefs. 50 pieces formerly milled in 3.10 hours, now band machined in 1.35 hours.



48 HOURS SAVED cutting .100 x .4375 slots in rotors. 2000 formerly milled in 66.6 hours, now band machined in only 18.6 hours—72% less time.

New DoALL Contour-matic band machines have opened up an entirely new machining concept. An automatic hydraulic power feed table carries the work into the thin continuous-cutting band tool. Integral recirculating coolant system and air jet promote high cutting rates and long tool life. Cutting forces hold the work down to the table—only the simplest fixtures are required. Tooling cost is far less than for other machine tools. Setup and machining time is greatly reduced.

Faster cutting . . . lower tooling cost . . . lower capital investment (a DoALL power feed band machine costs but ⅕ to ½ as much as production milling machines, shapers or planers)—These are the money-saving advantages of DoALL *production band machining.*

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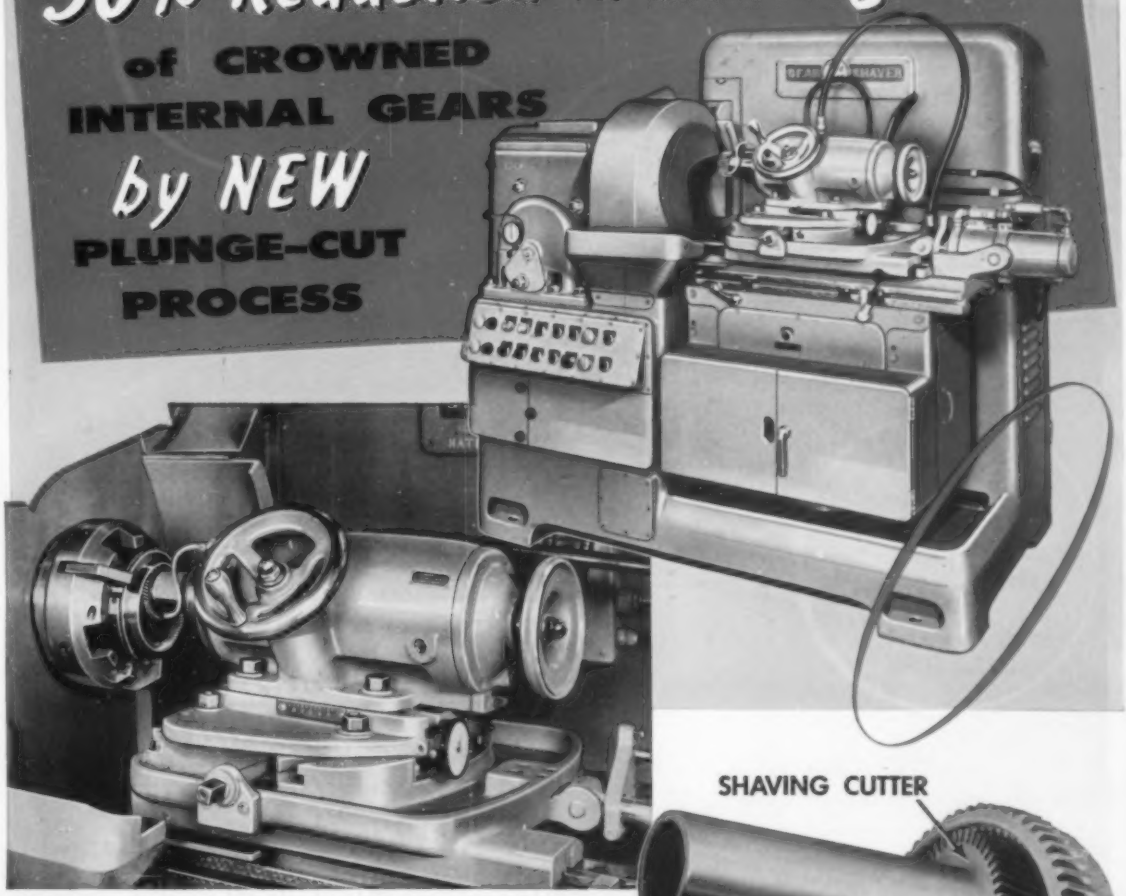
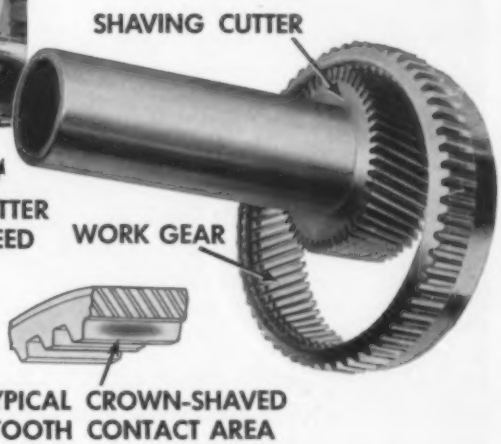
50% Reduction in Shaving Time

of CROWNED INTERNAL GEARS by NEW PLUNGE-CUT PROCESS





This typical internal automatic transmission gear is crown-shaved in 24 seconds machine time with the tooling shown.

Amount and position of crown for any specific work unit is optional.

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Management Digest

FEBRUARY 1956
VOL. 11—NO. 2

Tokyo: Asia's New Trade Center?

Digested from BUSINESS WEEK, Dec 10, p139

"Japanese sales to the U.S. are booming—topped $380-million in '55."

"British and German exporters are losing ground in North and South American markets because of Japan's trade drive."

"Japanese toy industry is competing . . ."

"Stainless-steel flatware from Japan is competing . . ."

"Japanese shipyards are getting bigger orders . . ."

Headlines like these have been read in great numbers recently by businessmen the world over. And many of these readers have experienced more than just a headline—more than a mere newspaper account of some faraway industrial activity. They have, indeed, felt the very sharp pinch of Japanese competition—in many industries, in many countries.

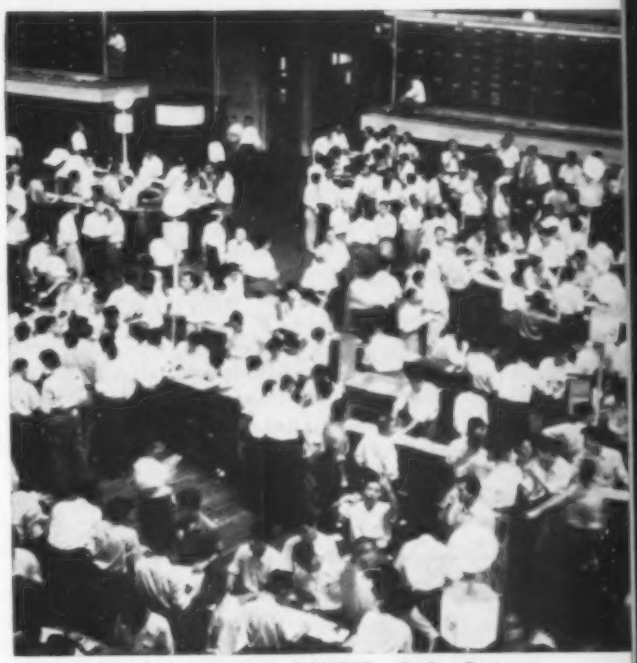
And what of this re-awakened competitor, Japan? How far will she go toward invading the world's buying markets—especially those in which light manufactured goods play a big part? What can the world business community expect from newly revived Japan?

A look at Tokyo, center of Japanese finance and commerce, helps the outsider to better understand the answer to these questions. The future success—or failure—of Tokyo as commercial capital of the Far East will largely mark the future of Japan as a nation of economic influence.

The new metropolis, Tokyo, bears little resemblance to the city that surrendered itself to the Western powers at the close of World War II. A big new city has been born and is growing fast. The central problem no longer is reconstruction, but rather how to expand fast enough to keep up with the rising population. The city is overburdened with people and new activity. At present, facilities are far from adequate—especially housing.

Tokyo has more stores and factories and more houses than ever before. Its population—over 8-million—ranks close to London. It is growing faster than any of the world's major cities. Population will probably hit 13-million in 20 years. About 300,000 people move from rural areas to Tokyo each year, adding themselves to the 100,000-a-year natural population increase.

Most of the newcomers are unable to find steady jobs in the city—in spite of great industrial expansion. Some manage to exist by part-time jobs, seasonal work, etc. Others live in crude shanties, in vacant properties, in the streets. The city government is aware of the problem, and expects to expand



THE FINANCIAL NERVE CENTER of the Japanese economy, Tokyo's stock exchange, is a rising Wall Street

THE OLD AND THE NEW stand side by side in Tokyo—workers houses and modern office buildings

the city area four times in the next 20 years.

Blueprints for the future call for a "Greater Tokyo"—a city that in 10 years may well be the largest in the world. The plan goes much further than relieving population pressure. What the city planners and business leaders want is a metropolis that combines the best of their country's culture with the best of Western technology.

This concept, the combining of two civilizations into a stronger third civilization, will guide Tokyo's effort to achieve greatness in the years ahead.

The city's industrial production is valued at about $2.3-billion a year, 14% of Japan's total, and 55% greater than that of Osaka, the prewar commercial center of Japan. Today, Tokyo outranks Osaka in all manufacturing except textiles. Osaka also holds a slight lead in export business, but that, too, is changing rapidly.

More than a third of the postwar trading companies—including two reorganized trusts, Mitsui Bussan Kaisha and Mitsubishi Shoji—have located in Tokyo. These companies and the banks, which always have been centered in the capital, are the two strongest forces in Japanese business. The result is that Japanese industry and trading will tend, more and more, to become concentrated in Tokyo.

Another influence tending to make Tokyo the center of business is the government of Japan. It is vitally interested in business and attempts to help the businessman in many ways. It is especially interested in helping the development of Japan's export trade. Thus Tokyo tends to attract many businessman who wish to be close to the center of government activities.

The backbone of industry in Tokyo is made up of many small manufacturing companies that employ no more than about 200 workers. Most of these are private homes converted into factories with the family as the working force. These little businesses account for around 96% of Tokyo's 42,000 manufacturers. Their output is 60% of the city's total.

The home industries produce finished goods, but many are sub-contractors turning out parts with crude tools for larger manufacturers. The growth of the big trading companies, like Mitsui, has actually helped the small home-type businesses. The large trading organizations use tremendous volumes of sub-contracted items.

New industries are developing at a fast rate. One of the best examples is camera making. About $25-million worth of cameras are turned out annually in Tokyo—82% of total Japanese production. Roughly 85% of the cameras are exported, mostly to the U. S.

Metal toy manufacturing is another important industry in the city. More than 100 small factories produce $41-million worth, mostly for export.

Other Tokyo industries include wrist watches, Christmas lights and ornaments, antimony goods, binoculars, pencils, telephone receivers, cranes, steel products, sewing machines, automobiles, electrical wiring, motors, motion pictures, and chemicals — Tokyo's newest industry.

In looking ahead, Tokyo looks abroad. A giant $55-million project is now in progress to develop the city's harbor. Within 10 years Yokohama's port facilities—about 20 miles from Tokyo—which handled all of the capital's prewar commerce, will no longer be used by Tokyo.

Tokyo's harbor was opened in 1948 to ocean-going ships. In 1954 it handled 1.5-million tons of export-import cargo, plus 5.8-million tons of coastal shipping. Another 3-million tons passed through Yokohama. Tokyo plans to expand its port facilities to handle more than 15-million tons of freight annually. Passenger ships will continue to dock at Yokohama.

Tokyo's International Airport boasts a modern terminal completed in 1955. The airport is the finest in the Far East. More than 100,000 foreign travelers passed through it in 1954.

There is a dark side, too—in addition to population pressure: Expansion and prosperity need much boosting in some areas. As to business practice, for example, the blending of East and West could be much smoother. In Tokyo's business and financial offices, work moves at a very slow pace. Businesses are over-staffed. Office routines are outdated and cumbersome. Office typing, for instance, is a constant bottleneck.

Retail industry in Tokyo is sick. There are 150,000 stores in the city —50,000 more than prewar. There is much duplication of similar stores, much over-competition. Family businesses are lucky to keep going. They are being swallowed up by a few large department stores with suburban branches.

Housing, schools, and hospitals are in great shortage; health facilities are inadequate—all of which creates a doubly serious problem when combined with abnormal population growth. Area expansion and decentralization of the city cannot come too soon.

Quote of the Month

A. R. W. LOW

Minister of State, Board of Trade

United Kingdom

"Britain's success in the world's markets depends not just on industry's ability to supply the right goods at the right time at the right price, but on Britain's ability to convince overseas customers these things are right . . . All I hear and all I have seen in visits overseas proves to me that, more than ever before, it is necessary to study carefully the exact needs of our customers and to be informed of the full potentialities of our markets. Skill in production should be met with skill in selling."

IRANIANS tour U. S. offshore facilities in boat, will go home to help as . . .

Iran's Oil Flows Again

Digested from BUSINESS WEEK, Nov 26, p116; PETROLEUM WEEK, Nov 25, p12

Only 2 years ago, Mossadegh nearly brought his country to chaos and Communism. Today, Iran is hopeful. The country is once again a factor in the world oil market.

The 17-company consortium operating Iran's petroleum industry will have earned for Iran in the current Persian year (ending in March) close to $100-million. In 2 years time, the figure will approach $200-million. In addition, the industry brings to Iran about $50-million a year in foreign exchange to meet expenses.

This income represents a good share of oil. Iranian Oil Exploration & Producing Co., one of the consortium's two operating companies, expected to average 375,000 barrels daily last year. This year it promises nearly 500,000 barrels daily and next year 637,000 barrels—about the prenationalization peak.

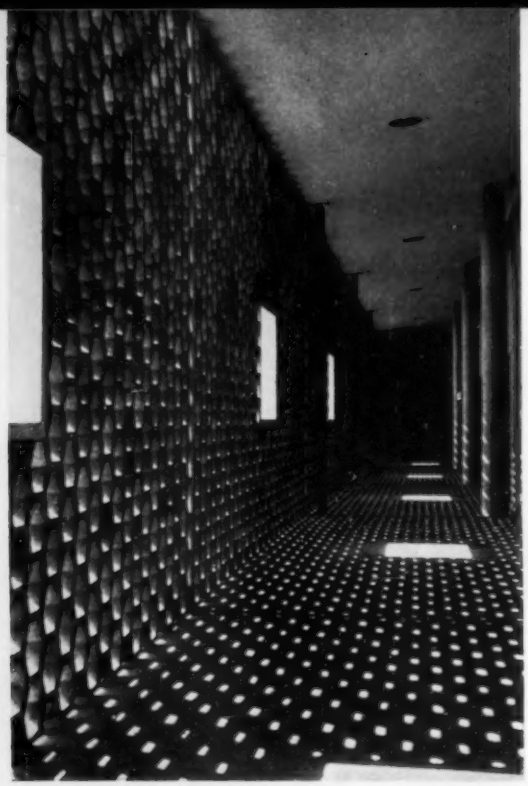
To meet this ambitious program will require new exploration, new fields, new facilities, and the men to operate them. To meet this last need, 25 Iranians were sent to various countries last year for training; 25 more will go early this year.

Training sites are picked to fit the experience desired. The present program includes the oil fields of Venezuela and the U.S., refineries in the U. S., England, Holland or France; the electrical and mechanical industries in these countries; civil-engineering projects; and various departments of oil companies.

Typical trainees are two of the 11 in the U. S., M. S. Khalili and N. Baniriah, both the equivalent of production superintendents. After 3 weeks in Venezuela, Khalili (hatless—at the right) and Baniriah (with mackinaw) spent a month touring Atlantic Refining Co. facilities—tank farms, offshore sites, refinery units, compressor stations.

They studied lease equipment, low-temperature separation, gas treatment, corrosion control, gas lift, well treatment, salt-water disposal, permanent and dual completions, and other operations.

The consortium, besides training Iranian technicians, is building homes, improving hospital facilities, buying new buses and cars, and encouraging private Iranian enterprise to start stores, ice plants, and other new businesses. Along with the oil money going into dams, roads, and schools, it is building a new market for world traders.



MODERN CONCRETE and old tile work combine in technique for sun shading. (Rio de Janeiro, Brazil)

MOUNTAINS make way for apartment houses for middle income families. New apartments are built on flattened

FLUIDITY OF DESIGN, as demonstrated by this bank interior, is cleverly practiced. (Rio de Janeiro, Brazil)

INDUSTRIAL BUILDINGS take on beauty through Latin architects. Note thin-shelled umbrella roofs. (Mexico)

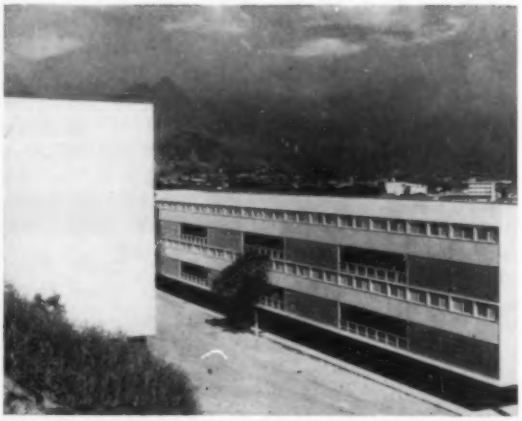
Latin America: Its

Since 1945 the world's biggest building boom has been rolling on unabated in Latin America. Two factors backing up the boom stand out: a population-growth rate twice that of the rest of the world and a general upgrading of the area's cultural and economic development.

Throughout Latin America, complex university cities, public housing projects, stadiums, night

iddle ountain slopes. Project replaces slums, some of which tenel an still be seen in the foreground. (Caracas, Venezuela)

CROSS VENTILATION is assured by having apartments face on two sides of buildings. (Rio de Janeiro, Brazil)



HOUSING PROJECTS, usually state sponsored, make up a good part of Latin America's building boom. (Mexico)

TALL BUILDINGS dot Caracas skyline. Polar building, modern by any standards, rises in a new area of the city.

ts Architecture Is Its Own

clubs, hotels, industrial buildings, churches and private houses have been built and are being built. And there's no prospect of a let up.

New York's Museum of Modern Art has found Latin American architecture impressive enough to hold a major exhibition of photographs showing the area's colorful and dramatic achievements. The exhibit served to emphasize this fact: Latin America now has an architecture distinctly its own and suited to its way of life.

These are its main characteristics:

- Wide-spread use of concrete in conventional cage construction and thin shell forms.
- Many devices to control excessive heat and glare of the sun.
- More use of color: painted stucco or mosaic.

Electronic Banking Is Cheaper

- **Businessmen burdened with heavy paperwork should take a look at the banking industry**
- **More and more U.S. bankers are using electronic equipment for routine clerical jobs**
- **Money savings are big. Semi-automatic "systems" will soon be available at fair cost**

Digested from THE WALL STREET JOURNAL, Dec 7, p1

High-speed electronic machines are cutting operating costs for many bankers these days. Push-button bookkeeping is no idle dream. It's a practical, money-saving possibility for bankers and businessmen the world over.

A spokesman for the American Bankers Association—trade group representing 14,000 U.S. banks—said recently: "Automatic machinery for banks may be as much as five years off, but semi-automatic 'systems' will be ready in a matter of months at reasonable costs."

Some hard economic facts lie behind the bankers' urge for mechanization. Three big factors are (1) rising labor costs—with the prospect that machines will replace many routine workers, (2) a big expansion in business volume—with increased paperwork, and (3) a growing need to improve customer services to keep pace with competitors.

Because of growing business, the number of bank employees in the U.S. has risen 65% since 1939. Moreover, workers' salaries have jumped sharply since World War II.

The number of checking accounts in the U.S. was 27-million in 1939. By 1952, the figure was 47-million. Nearly 8-billion checks were written in 1952; the total is expected to hit 14-billion by 1960.

Many banks have made a start toward mechanizing routine operations to cut down costs.

• Dramatic savings from use of machines have been achieved at New York's Chemical Corn Exchange Bank. The bank mails out 1.7-million dividend checks a year. Recently it installed a roomful of Addressograph-Multigraph Co. machines to compute the amounts of dividend payments and prepare the checks. Yearly saving is 15,000 man-hours — compared with the old manual method. The $90,000 machine investment will pay for itself in less than 2 years. Several other large New York banks are using similar systems.

• The Security Trust Co., Rochester, N. Y., has 22 kinds of machines, made by International Business Machines Corp., doing everything from handling special Christmas savings accounts to bank audits. The number of chief clerks has been cut from 15 to one. Personnel costs under the old manual system were about $500,000 a year. Under the electronic system they are down to around $259,000.

• Western Saving Fund Society, Philadelphia, has a Remington-Rand "Univac" computer that makes year-end interest computations on the bank's 290,000 savings accounts in less than 33 hours. Formerly a "big force" of clerks took about 3 weeks to do the job.

• Philadelphia Saving Fund Society uses electronic computers to add deposits, subtract withdrawals, state new balances, calculate interest and perform related work. The "system" can handle 100 transactions a minute. A bank official says "It would have taken 61% more people than the present bookkeeping force to process the past year's business."

Research and testing of highly advanced machines are taking place in the electronics industry and in banks throughout the nation. For example:

National Cash Register Co., Dayton, Ohio, is bank-testing its latest electronic bookkeeping machine called the "Postronic." It picks up automatically any data that affect a customer's account. The machine verifies the selection of the account, picks up the old account balance, and determines whether the depositor is overdrawn. (If he is, the machine comes to a halt.)

Burroughs Corp., Detroit, Michigan, is introducing its "automatic bank bookkeeping system." The equipment places on checks a depositor's name and account number, plus a code in the form of invisible dots. A high-speed sorter reads the code, enabling the bank to sort checks by customers or distribute them to other banks. Burroughs claims the new system will enable one operator to do the work of four persons using "conventional" equipment.

The three biggest commercial banks in the U.S.—Bank of America, in California, and Chase-Manhattan and First National, both in New York—all have new machines of the "electronic brain" variety in various stages of development. Cost may range as high as $1-million per installation.

New

A gigantic World Trade Fair will be held in New York from April 14 through April 27, 1957 at the huge Coliseum now being built. This event will rival the Paris, Milan and other great fairs. It will be part of a plan to assist businessmen abroad to earn more dollars in the U.S.

Local and Federal Government officials maintain that vast opportunities lie ahead for foreign exporters. Chief reason is that the U.S. must have outside help to support a $400-billion economy.

Exporters in other countries should make arrangements now to exhibit their products. Write to World Trade Fair, 331 Madison Ave., New York, N. Y.

Digested from AMERICAN LETTER, Dec 10

Automation: Will It Hurt Small Business?

Digested from HARVARD BUSINESS REVIEW, Nov-Dec, p27

The man at the control panel above has a fortune in capital equipment at his fingertips. By pressing a few buttons and flicking some switches, he operates a large industrial plant—or at least a sizable part of one. He handles work, alone, that kept a hundred men busy just a few short years ago.

His ability to perform this miracle of easy labor arises, of course, from scores of unseen electronic devices—delicate instruments that connect many units of conventional machinery into a single system. The impressive control panel is actually an electronic brain center. It is the focal point of "automation."

The small businessman looks at automation and sees himself frozen out of business. He thinks of automation as an expensive venture for BIG companies only. He sees his own small business outproduced and under-sold by a mechanical labor force that he can never hope to employ.

Are his fears justified? They may be—they may not. It could depend on the particular industry. It could depend even more on the small businessman's foresight and ability.

Automation is not an all-or-nothing proposition. It can be partially adopted by many small companies in many industries. This is a point the small businessman often overlooks. Like most other business and production practices, automation can be brought into a company step-by-step over a long period of time. It is not magic—not a complete package.

The small businessman will have to be alert. He will have to determine just how much automation is available in his particular line of business and how much he can afford to adopt. He will have to take on as much as he can reasonably handle—that is, if he expects to compete pricewise with the large companies. There is, of course, a very great cost advantage—cost reduction—once automation is installed and operating.

AMERICAN MACHINIST magazine surveyed 1,574 concerns and learned that 25% had installed some form of automation. Of those that did, less than 25% reduced their labor forces. Many had hired more workers.

Most small concerns cannot afford to adopt automation as fully as the large plants. They cannot hope to realize the savings which big business will gain through "automated" production. But in many industries they can achieve a profitable degree of automation with "standard" equipment. A good example: feed mills and fertilizer plants. Small concerns can thrive in these automated industries.

In other words, the small competitor can stay close to the big company—in terms of production costs per unit sold—IF the standard equipment in his particular industry is highly automatic. This

simply means that automation is available to all members of the industry, big and small. The fear that automation will freeze out the small businessman may therefore be true for some industries but not for others.

The dividing line is the time and cost of research and development required to achieve automation in the industry. If it takes much individual experimentation, designing, etc., then the small business will suffer. The initial investment in special automatic equipment would be too great.

The severity of automation's effect on small business will be altered to some extent by the nature of the market. Those who manufacture and sell locally need fear only the particular automation that can produce for the same local markets. Where the costs of transportation prevent national distribution of the output of a highly automatic plant, the local businessman can breathe easier.

Automation reduces production flexibility. The big highly automatic manufacturer is therefore likely to lose flexibility which the smaller firm will retain. The small firm will be able to build specials, handle custom work, meet deadlines, do rush jobs and many things that require the ability to shift production methods and output on short notice. Large automatic plants will not compete in this area.

Thus, automation may be a boom to the small businessman who is alert about production and marketing in his industry. When a new product, a new material or a new idea comes along, he may develop it and have it on the market before the highly automated plant can even get the plans drawn.

On the other hand, it is doubtful if the small concern can exist by "making a conventional product, in a conventional way, to distribute through conventional outlets, at a conventional price, if he is faced with automated competition."

Automation means more time, work, and worry for management. But as one leading executive said recently, "The firm that neglects automation will lose either its money or its market—or both."

"Brainstorming" Method Develops New Ideas

Digested from PRINTERS' INK, Dec. 9, p23

More and more leading companies are becoming "creativity-conscious." Creative thinking to produce new ideas has caught the practical imagination of many far-sighted management men. Companies that now sponsor creative training programs include: General Electric, International Business Machines, General Motors, U. S. Rubber, Ethyl Corp.

In addition, scores of smaller firms have their creative eyes open —looking for new ways to develop the high skills and imagination of their foremen, supervisors and management executives. There is a growing realization among smart businessmen of the importance of new ideas in competitive markets—plus a feeling that a great potential of creative talent is wasted in the average business.

Two types of programs are being developed in industry. The first, the educational approach, is designed to teach people to increase or, at least, to better utilize their innate creative abilities. Results of these programs are hard to measure. Exact company experience is not generally known. But concerns using the educational approach have shown faith in the idea of awakening creative interest on the part of key employees.

The second type of program is a direct approach and aims at the spontaneous creation of new ideas. Conference methods are used to bring forth hidden talents and solutions to tough problems.

"Brainstorming" is the spontaneous method that is receiving widest attention in industry. The technique was developed by a leading New York advertising man, Alex F. Osborn.

Basically, a brainstorming session is a conference in which all evaluation and criticism are suspended. ANY idea on the problem is welcomed. After all ideas have been listed and the session ended, the ideas are evaluated—often by a different group or individual.

This encouragement of unusual ideas has a sound psychological basis. People lose their natural restraint and express themselves freely—without fear of ridicule. Since all conference time is devoted to new ideas and none to evaluation and criticism, a great number of ideas usually result.

Those taking part are encouraged to improve upon the ideas of others. Foolish ideas are often given a practical twist. True, only 5 or 10% of the ideas produced are worth considering. But quite often an hour-long session will result in a hundred or more ideas.

Another new group-conference method—a variation of brainstorming—is the Gordon Technique. It was developed by W. J. J. Gordon, a research consultant of Cambridge, Mass. Gordon's company maintains a group of seven men who use the technique to invent new products for clients.

In a Gordon session only one person—the group leader—knows the particular problem to be solved. Other members discuss freely a general subject that is related to the specific problem but that does not reveal it. The group relies heavily on free association and follows any avenue their discussion takes until the group leader restrains them.

The group leader attempts to apply the general discussion to the problem at hand. When he sees a possible solution he reveals the exact problem. Then the group tackles the problem in the conventional conference manner—using the new idea as a starting point.

Benefits of brainstorming are broad. An expansive, creative atmosphere is developed. People tend to think ahead and apply imagination to the ordinary problems of business. Key men become idea-conscious. Communication within the group becomes freer, better. Morale is improved.

Compulsory retirement of older workers may be a waste of needed manpower. Age alone does not measure employee-value.

Where You Can Use the Older Worker

Digested from PERSONNEL, Nov, p246

The problem of the aging worker exists because more people are living longer and staying healthy and productive longer. As medicine and living standards advance, the age trend will continue. It's a factor that businessmen should consider when hiring and lay-off policies are reviewed.

Many companies are retiring increasing numbers of older people who are still fully able and anxious to remain on the job. The effect on the community and the worker is bad. The effect on company morale tends to be bad, especially among middle-age employees. The effect on production efficiency, in many cases, is to disrupt smooth operations and create a scarcity of skill and experience.

Research among personnel departments and job performance analysis have turned up some interesting facts about older people in industry:

• Productivity of older workers varies greatly among individual employees. Individual differences in performance increase with age. Almost always there are some older people whose performance equals or betters the average performance of the younger group. Even when specific abilities, such as vision, hearing and speed of movement, decline, the performance of the total job by older people bears up remarkably well. Because of their experience, older people tend to develop alternate ways of doing a job which compensate for "slowing up" physically.

• It is established that older people are often slow at taking in new information and acting on it. They find it hard to learn new jobs and new methods. Learning time increases with age. Thus they do best on jobs where performance does not vary—where the skill is a well established and accepted routine in the industry. Older people place more emphasis on accuracy.

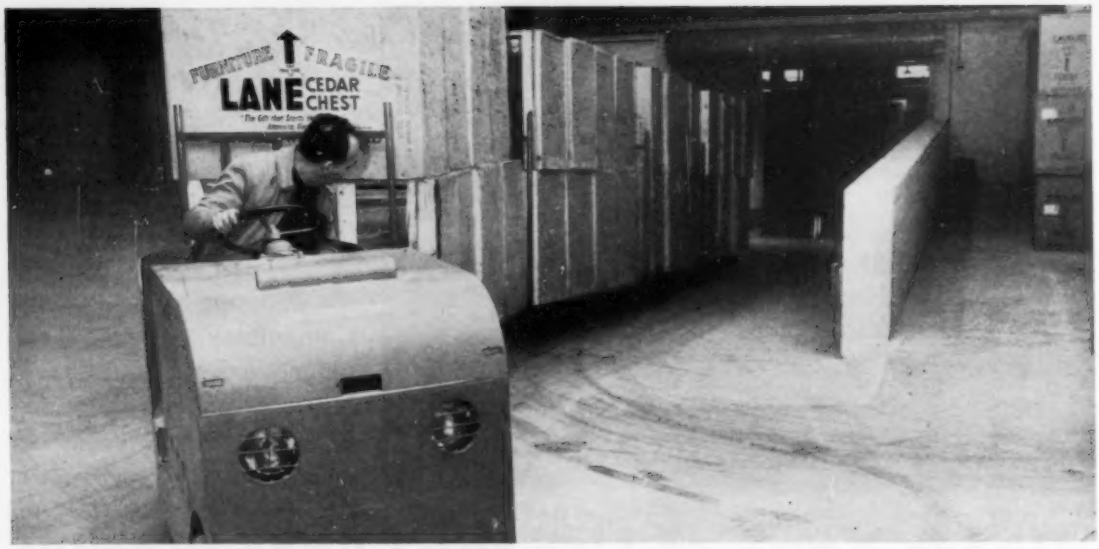
• Part-time work is a boon to older workers and often a decided advantage to the employer, too. There are many men and women working past the normal age of retirement who would like shorter hours on the job. Part-time work is ideal for many over-age people who have skill and experience and who desperately need, in addition to extra income, the feeling of usefulness which comes from a job. In many cases, businessmen ignore the fact that they could use these people on a short-hour basis for special jobs, rush jobs, slow season work, vacation fill-ins, or wherever a needed job does not justify the expense of a full-time worker.

• Attitudes of the older worker are most influenced by his health, personal finances, and the "human relations climate" where he works. Among all classes of older workers the usual desire is to continue, not to retire.

Retirement policy is a difficult question for most companies. There are no rules. Companies differ greatly. Some retire all workers at a given age (usually 65). Thus all employees are treated alike and know what to expect. Other concerns let the worker decide when he wants to quit, providing performance standards are met, and report great confidence in their older workers.

Some companies have established retirement committees made up of foremen and supervisors. All related factors in each case of possible retirement are considered. Decisions are reached on a highly individual basis. Fixed rules are forgotten.

Many companies—to make their retirement policies workable—are helping employees prepare for retirement. Pre-retirement counseling by the personnel manager is a trend. Line supervisors, too, do much in this area on a more "personal" level. Such programs are a great aid to the morale of the entire workforce.



Laying out a new plant? If so, avoid mistakes that can cripple your handling of materials.

Handling Plan Avoids Future Problems

Digested from FACTORY MANAGEMENT & MAINTENANCE, Dec, p84

Between 20 and 80% of your manufacturing cost goes for materials handling. Better methods could probably cut your handling expenses in half. Then why not adopt the better methods?

The answer is simple. You have a factory building that will not permit it. The ceilings are too low. The staircases are misplaced. The vertical beams are too close. The floors are weak. . . . You could go on and on.

The time to plan for handling, obviously, is before you move into new floorspace. Here are ten points to check in advance with your building contractor.

1. Check building size and shape. A growing practice is to design the layout of operations, then plan a building around the layout. Templates and three-dimensional models are used. Where handling systems are important, 3-D models are most valuable. Planning an exact floor layout in advance makes it easier to decide on the size, shape, and type of structure. Planning will point out the advantages and disadvantages of multi- and single-story buildings, rectangular and square shapes, low and high ceilings.

2. Check building columns. Trussing arrangements can eliminate multiple columns that would interfere with handling systems. Columns should not obstruct aisles that have been laid out for mobile material handling. Nor should columns prevent full use of storage space—in view of size of articles to be stored, stacking limitations, etc. Remember crane load in relation to column spacing.

3. Check floor-load capacities. Tell your architect what you will require. Figure on equipment load, storage load, volume and frequency of materials movement, number of trucks. If you will use floor conveyors, remember pits for the conveyor-drive mechanism. And remember that better floor surfaces aid smooth materials handling.

4. Check roof-truss capacity. This must be planned to bear the strain of overhead handling equipment. Consider maximum lifts, load weights, clearances. Free movement is important.

5. Check floor-truss clearance. Height of ceiling is vital. Advise your designer of (1) dimensions of machinery you will use, (2) size of loads that will pass overhead, (3) possible future needs, and (4) capacity of cranes. Make sure that trucks will clear sprinklers, pipes, etc.

6. Check doorways. Heights must allow for standard uprights on fork-lift trucks. Dealers in material handling equipment will provide all specifications.

7. Check service areas. Give your contractor the same kind of information for maintenance and service operation that you furnish for production. If electric trucks are used, plan on space for battery service.

8. Check elevators. They must be able to handle the combined weight of truck and load. Check elevator doors for size.

9. Check receiving and shipping areas. The important point is to get close correspondence between rail and truck dock heights and the floor heights of railroad cars and trucks. There is a tendency to make receiving areas much too small.

10. Check ramps and inclines. Hold inclines to a minimum. Fork trucks and similar handling units wear out fast if they haul over steep grades. Performance is poor, maintenance cost high.

Profit Result Better When "Insiders" Direct Company

Digested from BUSINESS WEEK, Nov 26, p128

An "insider" is an active member of management—frequently a company officer—who helps direct day-to-day business operations. He may or may not serve on the board of directors. He may or may not own stock in the company. He is "inside" the business.

An "outsider" is one who has a vital interest in the company—as either a stockholder or director, or both—but who plays no active part in management. For years a favorite debate among businessmen has been whether or not higher profits are made by a company that has insiders sitting on its board of directors. Many have said that the insider board—made up of company officers—is by far the more practical and profitable scheme of organization. Others have said that outsider directors take a broader view of company affairs and thus produce the best over-all result in management of the company.

A new analysis gives an answer that should interest new company organizers and those who may be thinking of changing their top-level organization. The survey says that insider boards are best.

Stanley Vance, professor of industrial administration at the University of Massachusetts, decided to dig into the question of board make-up. He analyzed 200 industrial corporations that are now leaders in sales volume and total assets. He compared the composition of their boards in 1925 with that of 1950. Then he studied each company's record to arrive at a series of performance ratings showing how each prospered during that period.

His ratings take into consideration profits, sales, spread of ownership, and total investment. He comes to two conclusions: (1) In recent years there has been an increase in the number of companies with insider boards. (2) Companies with insider boards have made a better profit showing than those dominated by outside directors.

Vance contends that even where companies have maintained an outsider board, the trend is toward giving more and more of the authority of the board to professional insiders of proven ability.

The American Institute of Management has published material that supports Vance's findings. AIM is a non-profit group that turns out an annual listing of what it calls "excellently managed" companies. Six of the eight industrial concerns that AIM ranks as top leaders are run by insider boards. In addition, among those AIM picks for special mention, 44 are insider-controlled and only 20 outsider-controlled.

The stockholder is affected. Vance says that of the corporations in his study which AIM lists as "excellently managed," 50 have paid steady dividends dating back more than 25 years. Of these 50 companies, only 13 are outsider-controlled, nine are mixed, and 28 are insider-controlled.

Vance says, too, that insider directors do not tend to acquire too much power—power that might hurt the small stockholder and the public. Government regulations (in the U.S.), competition and labor unions curb abuses.

In the next 50 years corporate directors will come mostly from within companies—if Vance's evidence proves reliable. He found that consumer-goods companies—in close contact with the buying public—have a high percentage of insider directors. Capital-goods industries are more frequently controlled by outsiders.

Consumer-goods industries, it seems, need policy makers who have had wide experience at lower jobs—especially in sales and advertising. Such people better understand the buying habits and attitudes of the public.

Friendship Court attracts visitors

Your Reception Hall Can Be a Big Asset

Digested from AMERICAN BUSINESS, Nov, p19

Hospitality and friendship have an important place in every business—or should have—according to Charles P. McCormick, head of a large food products concern in Baltimore, Maryland. His firm (McCormick & Co.) places great emphasis on making the visitor comfortable, whether salesman, customer, friend, or tourist.

The visitor at McCormick is ushered into a spacious group of rooms called Friendship Court, a replica of a village street of 16th-century England. Along the "street" are a teahouse (where visitors sip and eat McCormick products), a tea museum, a reproduction of an Elizabethan cottage, and other structures of Tudor-Gothic design. Girls from the office and factory act as guides for people who tour the building.

Business callers and many thousands of tourists have been well impressed by McCormick's improvement on the standard reception hall. Some of the tourists have been so favorably impressed that they have returned to apply for jobs. Some visiting businessmen have taken the general idea back to their own offices.

McCormick & Co. is convinced it has made a profitable advance in the art of public relations—and a profitable sales and goodwill investment.

The Time to Plan Safety Is During Plant Design

Digested from OIL & GAS JOURNAL, Nov 21, p207

Every progressive manufacturer is alert to the purposes of industrial hygiene: the prevention of both disease and loss of efficiency by controlling working conditions that may affect normal people.

In the past, industrial-hygiene practices were directed mainly toward the control of existing conditions. Today, many companies are applying engineering control features to potential health hazards at the blueprint stage—when the plant is being designed.

What can industrial hygiene do during this stage? It detects materials and physical agents within an environment that can affect the health of the worker. It evaluates them in quantitative terms in relation to their effect on the worker. It prescribes or designs practical controls.

To accomplish these objectives, the industrial-hygiene team must understand:

- The worker's limitations.
- His occupational relation to his tools.
- His physical contact with materials.
- Physical factors of the chemicals and materials that might contaminate the working environment.

A typical industrial-hygiene team is generally made up of a physician, an industrial-hygiene engineer, and a chemist. The industrial-hygiene engineer concerns himself primarily with field studies, collecting atmospheric samples, making physical measurements, evaluating the results in terms of their effect on health, and preparing proposed control measures.

The chemist concerns himself with the analytical work involved in handling samples, as well as collecting them. He also can supply information on how poisonous different products and materials may be.

When control features can be built into the process, they are more efficient and economical than those added at a later date. Futhermore, when such control features are part of the original unit, no health hazard is allowed to exist even for a short period. But this cannot always be done, even when the design engineer considers safety in his design. Unexpected hazards often appear.

In a new gas plant, for example, mercury was used in the distillation units in the laboratory. Spilled mercury found its way behind a bench and into small cracks in the floor. Vapors rose to contaminate the atmosphere during the heating season while windows and doors were closed. It was necessary to replace the flooring with impervious material and relocate the furniture to allow cleaning behind each piece.

The industrial-hygiene engineer, working with the design engineers, can supply them with constructive ideas on expected health problems and control methods. He can inform them on how poisonous (toxic) the materials are, whether the problem is inhalation or skin contact, what the possible points of exposure are, how serious the exposure would be.

In studying new potential problems, as well as old ones, the industrial hygienist follows this procedure:

1. Develop toxicity data on all materials used.
2. Determine quantitatively the atmospheric concentration of poisonous materials.
3. Evaluate the health hazard based on recognized limits.
4. Watch exposed workers.
5. Develop control methods.

Evaluation of the environmental health of a plant may be made this way:

1. Make a preliminary survey to inventory health factors and a list of all materials used.
2. Make atmospheric tests when indicated.
3. Determine contaminants and physical factors of the environment in quantitative values.
4. Analyze biological samples (body fluids) if necessary.
5. Make statistical studies of sickness records.
6. Study possible relation between working conditions and medical data.
7. Develop control procedures whenever indicated.

The experience of Humble Oil & Refining Co. with a sick painter shows the value of a definite procedure and the data it collects. A study of materials and application methods showed no exposure to lead. But an analysis of body fluids indicated hazardous absorption. Inspection of the worker's off-duty activities revealed that he painted farm machinery with red lead for his neighbors. When he stopped that, he was soon normal.

Humble Oil also found that industrial hygiene can do more than care for the safety of the workers. The oil company has helped its sales department prepare precautionary labels as to safe use of petroleum products. Another likely field of service would be to inform customers concerning the safe use of such products in their plants.

New

Industrial television has been turned to a new purpose by television station WCET, Cincinnati, Ohio. The idea: to beam dramatized training programs directly to industrial audiences.

WCET presents a television drama—with professional actors—dealing with management, supervisory, or special training situations. The program goes to a closed-circuit audience in factories and offices scattered around the Cincinnati area. The station is developing a regular schedule (half hour, twice a week) and regular clients. Twenty companies in Cincinnati are cooperating. WCET hopes to finance the idea by "contributions" from the participating firms. WCET is a nonprofit, "educational" station.

Digested from BUSINESS WEEK, Nov 19, p70

PLASTICS PROFILE: Raw Materials to Process Plant

	Vinyls	Poly-styrene	Poly-ethylene	Cellu-losics	Acry-lics	Nylon (Poly-amides)	Fluoro-carbons	Pheno-lics	Amino Plastics	Poly-esters	Poly-urethanes	Epoxy Resins
Calendering	●											
Injection Molding	●	●	●	●	●	●	●					
Extrusion	●	●	●		●	●	●					
Sheet Casting					●							
Coating	●	●	●	●	●	●	●	●	●	●	●	●
Bonding	●			●				●	●	●	●	●
Paper and Textile Treatment	●				●				●			
Compression and Transfer Molding								●	●	●	●	●
Laminating								●	●	●	●	●

Growing Five Times as Fast as Industry . . .

Plastics Push Toward New Peaks

Digested from CHEMICAL WEEK, Nov 19, p36

From almost nothing 50 years ago, plastics and resins have grown into a billion-dollar industry in the U.S. Final figures for last year's output are expected to show over 3-billion pounds—almost 10 times the 1940 total, more than 100 times that for 1925.

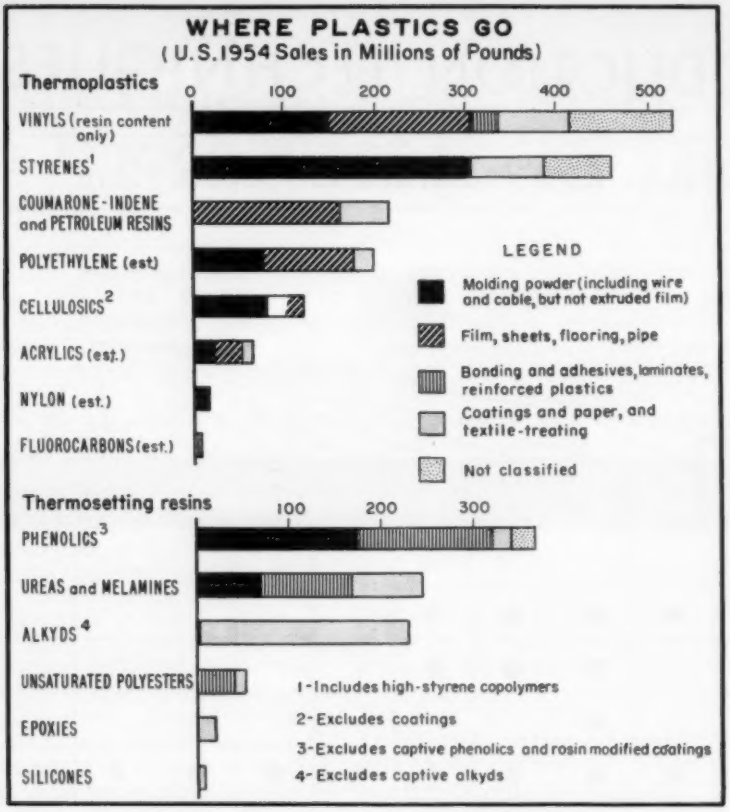
Plastics are already the chemical end-group of highest value. They are expected to grow almost twice as fast as the entire chemical industry itself, five times as fast as all U.S. industry.

Much of the growth has been at the expense of other materials. Already plastics output boasts of a greater volume than aluminum, copper, and all the other nonferrous metals combined. They likely will displace even more materials.

Investment in new plastics capacity is a sign of the industry's confidence. Polyethylene has attracted the largest number of companies and the largest dollar expansion. Two years ago, there were only two producers—Du Pont and Union Carbide. By the end of this year, at least a dozen companies will be in pilot-plant or full-scale production.

Much of the activity centers around the new semi-rigid, "low-pressure" polyethylenes produced by the Ziegler and Phillips processes. These materials will probably take business away from both vinyls and polystyrene, as well as from nonplastic materials.

Expansion is also taking place in vinyl chloride, despite an apparent surplus in capacity. In nylon, the competition between Allied Chemical and Du Pont may reduce prices and widen markets enough to bring Chemstrand and American Enka, both entering the



nylon fiber field, into nylon plastics.

Unsaturated polyesters can be made by anyone with a resin kettle; over 40 American companies are in the business. Markets are developing satisfactorily, but price competition will favor the companies with the strongest raw-materials position.

Polyurethanes and other isocyanate resins seem to be following the course that polyesters took. There is much activity by many companies but no substantial production yet.

A price squeeze is developing in the epoxy resins with four producers. A fifth, Dow Chemical, makes the two major components and could easily enter the field.

Polystyrene is showing no particular activity. American Cyanamid, Dow, and Hercules are developing three different methyl styrene monomers with promising potentials.

Virtually every plastic material will grow in use in the years ahead. At present, the thermoplastics as a group are leading the thermosetting resins, and vinyls reign unchallenged as the No. 1 plastic. It will be many years before polyethylene, which is moving ahead at a phenomenal pace, overtakes them.

The newer plastics, as in the past, will grow with the newer industries. What the electrical industry did for phenolics, the electronic industry may do for polythylene, epoxies, fluorocarbons, and silicones. The older plastics also will benefit: phenolic laminates for printed circuits; molded urea and styrene cabinets in place of metal for television receivers.

In transportation, the aircraft industry has led in use of plastics because of their light weight. A civilian plane, 90% reinforced polyester, will soon be on the market at a $9,000 price. Rigid polyurethane, foamed in place, is already filling dead space in airplane wings and in ships. Sandwich panels are in use in trucks and trailers. Railroads, to reduce pay load ratio, may be the next big user.

In construction, more than half of all indoor paint is emulsions, principally high-styrene-butadiene. Vinyl acetate and acrylics are pushing in. Polyvinyl acetate has proved itself as an outdoor paint that can resist hot sunshine. Sales of vinyl wall coverings are sensational.

Big construction uses for plastics have yet to be developed. Some ideas: polyvinyl-acetate-reinforced cement, reusable forms of polyester for complex concrete shapes, structural panels of phenolic-bonded wood waste surfaced with melamine, structural sandwiches with waterproof plastic facings on the outside, acrylic and translucent polyester glazing, plastic-foam insulation.

No one can pick a new plastic and say with certainty that it will be of huge commercial importance. But the following trends are significant:

- **The search continues** for more order in the molecule. Crystalline polystyrene could be next.
- **Plastics men** are just learning how to make the right "polyblends," which are mechanical mixtures of polymers with the best properties of each one. Examples: phenolic and rubber, polyethylene and polyisobutylene, polystyrene and synthetic rubber, vinyl and ethyl cellulose.

To reduce cost, researchers are crossing the more expensive thermosets with cheaper ones, such as urea with melamine, phenolic, epoxy, alkyd, or silicone. Block and graft copolymerization may give us cheaper terephthalates, better elastomers.

- **Irradiation** from radioactive wastes can form cross-linked, heat-resistant polyethylene. It can also polymerize solid monomers and give polymers of exceptional purity. Research continues in this promising field.
- **High-temperature** plastics are still needed for structural parts of jet aircraft and in ultra-high-frequency electronics. The phenylene group may fill this need. The attractive heat resistance of fluorocarbons and silicones has prompted study of similar plastics for this use. Among possibly new valuable families of plastic materials are the sulfones and organic compounds of phosphorus, boron, and aluminum.

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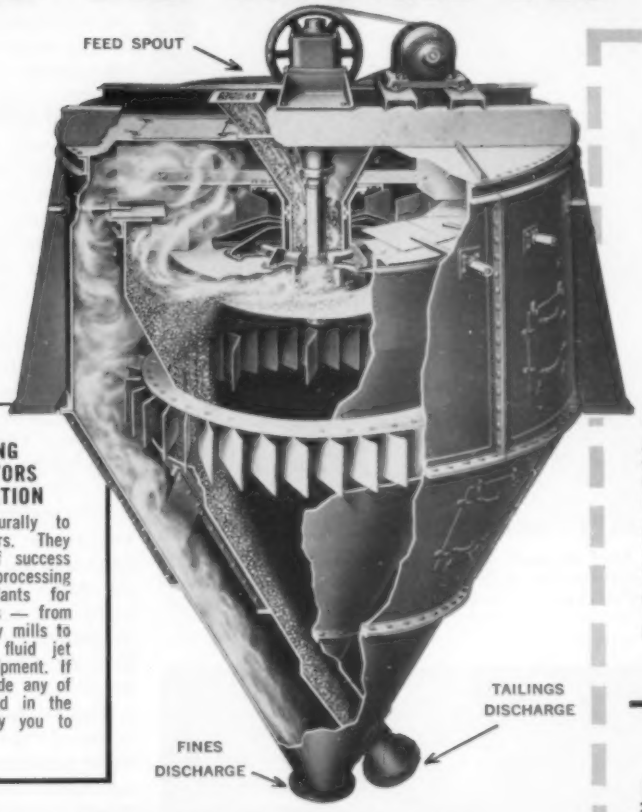

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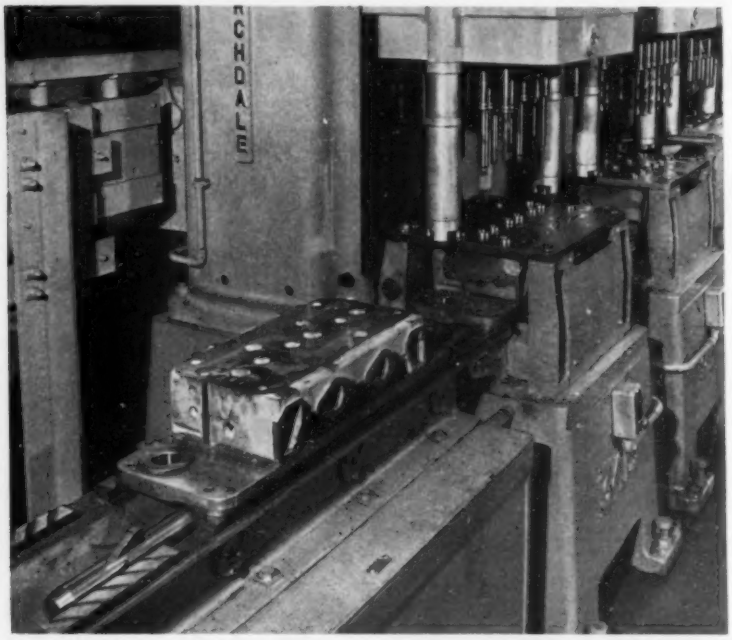
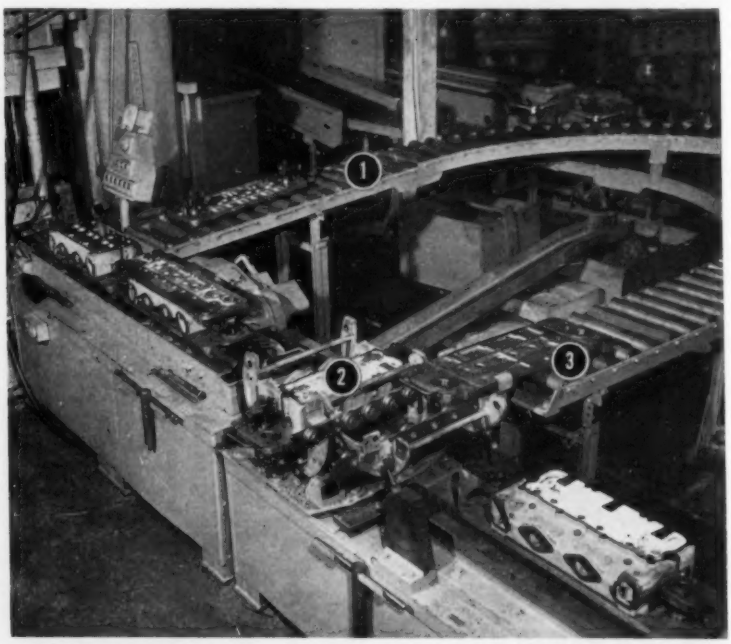
Maybe You Can Use Faster Machines

Digested from METALWORKING PRODUCTION, Nov 18, p 1951



PALLET carries cylinder head through the battery of transfer machines. It is located and held by plungers on the drillhead. Neither special work fixtures with locating and clamping devices nor separate control mechanism is needed.



TURNOVER of cylinder head is made at transfer station between first and second transfer batteries. New pallet from conveyor (1) is fastened to top of head. Assembly is turned over (2), and first pallet removed to discharge conveyor (3).

High-speed, automatic machines, as a rule, fit the big shop with high production rates. But they can fit the shop, too, with much lower production rates. So officials at the Southall Works of AEC Ltd. (England) thought. Then they proved it.

When AEC designed an entirely new range of diesel engines, it seized its chance to switch from a batch-lot production basis to line production for its cylinder heads and engine blocks. The production rate: only three engine units per hour, with two cylinder heads per engine.

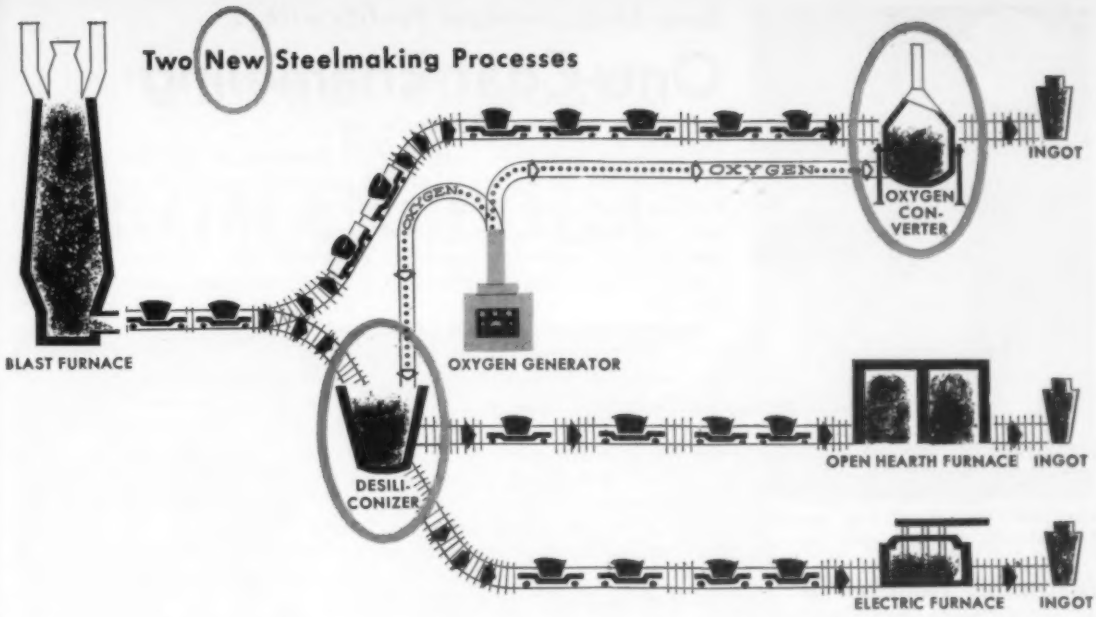
The decision to use transfer machines in the cylinder-head line was based on studies showing better use of available labor, savings in space and inventory, and the possibility of conversion of the transfer line.

Conversion of the line from one engine to another is made by changing only the multi-heads and jig plates. This flexibility is gained by fastening engine components to pallets during their passage through each group of transfer machines.

The machines are actually batteries of separate machines linked by a latch-type transfer bar and slide rails. Each machine is, in effect, a standard type of machine that would have been bought in any case when converting to flow line production.

The saving in manpower justifies the extra cost of the transfer equipment. Output per man on the cylinder-head line has been increased about five to six times. Each worker has 30 horsepower available instead of the 7½ with the previous batch method. Furthermore, all machines have been designed with a common loading height to reduce workers' effort.

The company plans to run the new lines on a particular engine for 3 or 4 weeks to build up a stock of parts. Then it will change the tooling to make a different type of engine. This again will run for several weeks before the line reverts to production of the original engine.



New Ways to Raise Steel Capacity

Digested from BUSINESS WEEK, Nov 26, p58

The promise of an increased yield of steel from the equipment that is circled in the flow chart above may point a technological way out of the dilemma of the steel industry today. This is the dilemma: how to expand capacity without paying ruinously for it.

In the U.S., and in other areas of the world, steelmen agree that more capacity is needed. Operating steelmen seem to think this way:

"I need 50% more capacity than I have. I can't afford to pay what it will cost to build it. But if I could produce 50% more from what I have, I would have solved my problem."

Such an approach, of course, is elementary. But it is not wholly impractical. Not all open-hearth furnaces operate at the same level of performance. One way to solve today's ingot shortage and tomorrow's financial shortage would be to raise average open-hearth performance to the level of today's best open-hearth performance. That way you boost capacity considerably with comparatively little new investment.

But a major breakthrough in open-hearth technology is needed. This is not yet in sight, so steelmen are looking elsewhere. Mainly they are looking at the oxygen converter.

The oxygen converter has some major attractions. For one thing, it costs about half as much to install, per annual ton, as new open-hearth capacity. Another advantage is more important than it seems: the oxygen converter takes up less space per annual ton of capacity. That is vital because many existing steel plants are physically cramped. The oxygen converter would let you get more annual tons out of the last space left in an old plant than a new conventional furnace would.

As long as existing plant can be enlarged, existing overhead facilities can be used. These things must be built into a new plant.

The oxygen converter has its defects, too. One is that it uses a good deal less scrap than an open hearth and requires a good deal more hot iron from the blast furnaces. That is fine while there is plenty of blast-furnace capacity and while scrap prices are high. It is less attractive when iron is scarce or scrap cheap. This lack of flexibility and the fact that the converter uses $6 worth of oxygen per ton of steel has caused some steelmen to wonder about its desirability. So most steelmakers are sitting back, watching the experiences of pioneers with the oxygen converters.

The desiliconizing process is so new that it has not yet been tried in a steel mill. Mechanically, the process closely resembles the oxygen converter—up to a point. The oxygen converter involves blowing high-purity oxygen down on a molten iron bath in a small (about 40 tons) batch-type converter, burning out excess impurities. The result is steel.

The new process goes one step beyond the oxygen converter. Blowing oxygen on a batch of iron raises its temperature about 500°F. above conventional levels. This superheated product is drawn off and charged into conventional open hearths or electric furnaces for finishing into steel.

Substituting superheated metal for normal blast-furnace iron in an open-hearth would increase ingot production 25 to 50%. In an electric furnace, ingot production could be doubled while lowering kilowatt-hours needed by 45%.

CONTOURING MACHINE, operated hydraulically was developed for . . .

Machining Honeycomb

Digested from PRODUCT ENGINEERING, Dec, p199

Shaping honeycomb material, used for many aircraft parts, was always a problem. The trouble was the lack of a suitable means of holding the material rigidly enough for machining.

A new method, developed by U. S. Propellers, Inc. (Pasadena, Calif.), has now overcome this trouble. Sections to be machined are mounted in wood or aluminum end frames and lowered into cardboard or wooden trays filled with water. Trays are then placed in a refrigerator at −20° F. to freeze the water.

The whole assembly, with or without the trays, are machined. The ice supports the cell edges, resulting in clean cuts. The process evolved from the company's method of forming propeller and fan blades of laminated wood and forged aluminum slabs.

The contouring machine handles workpieces up to 46 inches wide, 22 inches thick, and 12 feet long. A circular cam follower in contact with a templet mounted above the work transmits the proper motion to the circular saw blade. Both templet and work are mounted between centers. Two cutting heads, one on each side of the work, shape the honeycomb material. When the setup is made, a laminated wood assembly (as shown) is used to check tolerances.

Save Time, Increase Profits with . . .

One-Coat Enameling

Digested from CERAMIC INDUSTRY, Dec p50

For years, porcelain enamelers have searched for a practical process that would eliminate the costly and time-consuming ground-coat part of the enameling operation (McG-H Digest, Dec '51, p38; Mar '52, p24).

The problem has been to produce a time-saving and money-saving one-coat process that would:

1. Meet the end use physical requirements now satisfied by present multiple-coat systems.
2. Provide adequate adherence.
3. Be resistant to defects because of minor imperfections in the base metal and faults from minor fabrication variations.
4. Be applicable to any type of base metal that multiple-coat systems can enamel.
5. Be suitable for use with modern cover-coat enamels of all types.
6. Work with commercial ware under production conditions.

A new process, recently revealed at a Porcelain Enamel Institute forum, promises to meet all these requirements successfully. It's the result of 20 years of research at Parker Rust Proof Co. (Detroit, Mich.), in cooperation with Pemco Corp. (Baltimore, Md.) and General Motors Frigidaire Division.

The process consists of cleaning the metal surface of the enameling iron or cold-rolled steel, phosphate coating, prefiring, enameling, and final firing.

Cleaning with alkaline cleaners must remove all soil such as oil, drawing compounds, and fatty materials. Then the work is rinsed and pickled in a phosphoric acid type pickle that removes rust and scale and minimizes flash rusting of the cleaned surface.

Treatment with Parker Pre-Namel 410 produces an iron phosphate coating on the metal surface. The coating, noncrystalline in nature, can be produced in 1 to 8 minutes by spray or immersion at 160°F. Phosphate coating is followed by first a cold-water rinse, then a deionized water rinse to remove soluble contaminants that would interfere with subsequent oxidation of the surface.

Prefiring of the thin phosphate coating forms on the metal surface a heavier oxide layer about 0.001 inch thick. It is carried out in the conventional furnace used for firing porcelain enamel. Firing time is from 2½ to 7 minutes at 1450°F.

The oxide coating formed by prefiring receives and holds with great tenacity the one-coat enamel. The finish coat is applied by dip or spray. Coloring oxides can be employed in the usual manner as with multiple-coat enameling. Results are good.

Certain precautions are required in using the one-coat system. They are:

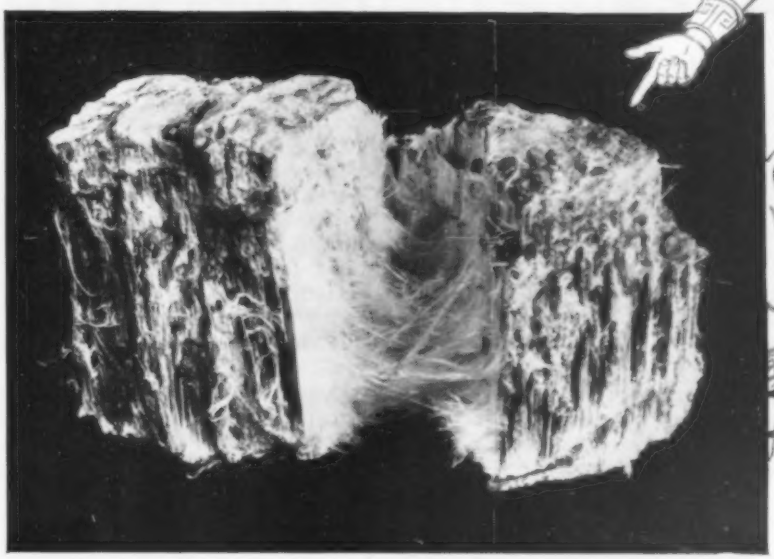
1. Parts must be clean; otherwise, a poor chemical coating will cause blistering of the oxide film during prefiring.
2. Prefiring should be controlled carefully to produce a normal oxide film.
3. The deionized water rinse must be free of chlorine and equipment must be free of lead to avoid oxide flaws.
4. As both the phosphate coating and oxide film are good absorbents, parts should not be handled by bare hands or exposed to fumes that might cause abnormal oxides. Likewise, parts should not be prefired in a furnace with parts being porcelain-enameled.

The Frigidaire Division field-tested the process with titanium-type cover coat enamels. All flowed out and adhered well; some were slightly freer of pinhole pits than others. The process is expected to be further perfected.

Enamels were both dipped and sprayed successfully. White enamels had to be applied to a thickness of 0.004 to 0.005 inch for satisfactory covering. Finished areas and spot welds covered very well.

A second phase of the field test is now underway. Frigidaire is processing parts and test specimens under different conditions and variations of procedure in chemical treatment and prefiring. Tests will continue.

"Threads of Gold" for a ROMAN TOGA



The mineral Chrysotile, meaning golden fibers, or threads, supplies over 90% of the world's asbestos requirements. Called the "miracle mineral" by the ancients, the Roman naturalist Pliny (23-79 A.D.) refers to the use of such material as "a rare and costly cloth" used for the funeral garments of kings.

The secret of the great usefulness of asbestos lies in its unique combination of fibrous structures, fire and water resistance, flexibility and strength. Since the profitable recovery of asbestos fiber depends upon fine crushing without destroying fiber length, a crusher that will perform such functions economically, and will produce large quantities of finely crushed material is essential.

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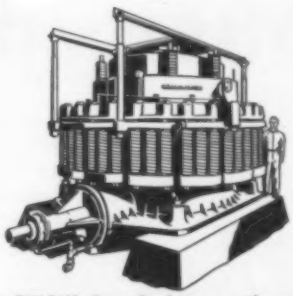

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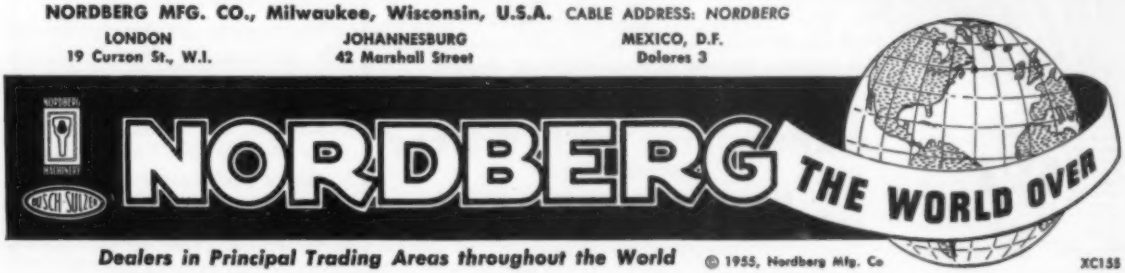

Dealers in Principal Trading Areas throughout the World

© 1955, Nordberg Mfg. Co

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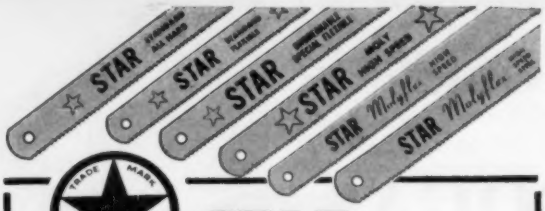

TRADE MARK

STAR BLADES

Specify one of these blades and you will get the most efficient and economical metal cutting possible today!

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MAKERS OF HAND AND POWER HACK SAW BLADES, FRAMES, METAL AND WOOD CUTTING BAND SAW BLADES AND CLEMSON HAND AND POWER LAWN MOWERS.

DUST is DYNAMITE!

ALL process dust is potential dynamite, if not controlled. It boosts costs "sky high" through increased equipment repairs, down time and general plant maintenance. And, from the angle of employee working conditions and community goodwill, dust can truly prove an "explosive" issue.

American Air Filter has devoted almost a quarter of a century to helping management keep costs down and plant morale up through effective dust control. Its engineering experience covers the multitude of problems found in many industries. Its line of product is complete—containing a unit to cope with any type of dust.

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Automation: How Much Does Russia Have?

Digested from AMERICAN MACHINIST, Dec 5, p132 & 182

Soviet metalworking plants, still struggling with the change from a peasant to an industrial economy, are making extensive use of continuous-flow production methods, but far less use of automation.

The Russian press has claimed many accomplishments in the field of automation. But their automatic machine-tool lines are essentially transfer machines, rather than line equipment built around return-information systems.

The simplest type of Russia's "automatic" line is formed from semiautomatic equipment, usually composed of only four or five machine tools. More complex lines use new and especially designed multi-position machine tools. But even these lines normally include no more than ten such machines.

Where are the Russians headed? They are aiming high. Their one producer of automatic machine-tool lines, after a 58.7% increase in the last 5 years, has been ordered to triple its output in the next 5 years.

New

Lumber companies may soon watch over their precious woodland and other properties with the ever alert eye of industrial television. Recently demonstrated to the lumbering industry was the Electronic Fire Watcher, made by Raytheon Co. (Waltham, Mass.)

The fire watcher is a portable and automatic television station that can be perched atop a fire tower to survey the forests for miles around. It relays pictures of surrounding areas back to forest headquarters. There fires can be spotted as they start.

The camera rotates automatically but can be stopped and reversed by remote control from headquarters. It shows an azimuth reading as well as the forest view. Headquarters can locate the fire by simple triangulation from the azimuths of two television pictures.

Digested from PAPER INDUSTRY, Nov, p754

A 4-cylinder Diesel Engine

FOR THAMES 1½ to 3 TON TRUCKS

Mr. Transport Chief, this engine is a sweeping success—operators everywhere from Northern Europe to Southern Africa acclaim this remarkable Diesel Alternative. Economical in price and operation, it's designed to cut your haulage costs to the bare minimum.

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Check these features against your needs:

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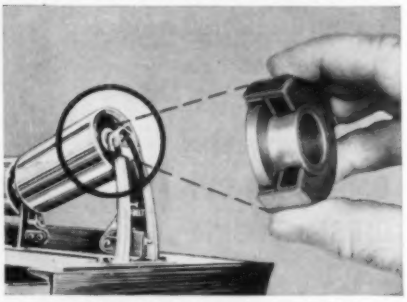
See your Ford Dealer for complete details.

PRODUCTS OF
FORD MOTOR COMPANY LIMITED
ENGLAND

Link-Belt reclaiming belt conveyor, with 140 of its 230-ft. length in tunnel, handles aggregates for a leading sand and gravel firm. Link-Belt makes all components and related equipment plus industry's most comprehensive line of idlers.

Sand is distributed to individual molders' hoppers at this mechanized foundry by Link-Belt flat roll belt conveyor equipped with plows.



Longer idler life is assured by unique Link-Belt idler grease seal, proved to be industry's most compact and effective.

Whether hauls are long or short . . . indoors or out, Link-Belt belt conveyors provide all industry with a

sure road to lower handling costs

EVERY year the tremendous cost-cutting potential of belt conveyors is being extended to longer, larger and more demanding installations. Spanning rivers or crossing mountains . . . traveling through tunnels or bridging city streets, their light, adaptable structures can extend for miles—over, through or under areas inaccessible to other transportation.

This bulk-handling giant performs equally well in mines, quarries and construction projects . . . in foundries, mills and factories—wherever material must be moved continuously, dependably. Capable of handling tonnages in excess of any currently practical requirement, belt conveyors can span great distances and often at lower cost than any other form of transportation.

Link-Belt was a pioneer in belt conveyor engineering, and has been a factor in supplying some of the largest, most complex installations operating today. Thanks to improvements in belt conveyor component design, weather and adverse operating conditions are practically no limitation on their use.

Whether you're planning a new plant or wish counsel on modernizing your present system, call Link-Belt. Our recommendations will reflect unrivalled background in belt conveyor engineering, backed by a complete line of conveying, processing and power transmission equipment. For details, call your Link-Belt Representative, or write LINK-BELT COMPANY, Dept. MD., 2680 Woolworth Bldg., New York 7, N. Y.

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One Man Runs Production Line

Digested from FACTORY MANAGEMENT & MAINTENANCE, Dec, p103

One man runs a mighty large operation at Westinghouse Electric Corp.'s Columbus, Ohio, plant. He keeps going a machine for washing and coating sheet metal with a drawing compound, a draw press, a finish sizing press, two annealing furnaces, and a lot of conveyor—all covering 3300 square feet. Handling help from automatic equipment makes his job possible.

The process turns out compressor shells for refrigeration units. This is the setup: Steel discs, blanked from strip, are washed, coated with drawing compound, rough-drawn into shells by a two-stage press. Shells are washed, annealed, sprayed again with drawing compound, finish-formed in a sizing press.

The operator shifts from station to station as needed. Shell blanks are delivered to the operator on special skids. Skids roll easily to position directly under an overhead conveyor. Operator removes blanks, places them—two to a hanger—on the overhead conveyor.

Blanks then go, via the conveyor, through a washing and "soaping" machine. ("Soaping" is the application of drawing compound.) As the conveyor returns the soaped blanks to the operator's position, he removes them and drops them into an automatic draw-press loader.

The loader is a turntable with three magazines. Each holds a stack of blanks. As the table indexes, a full magazine is positioned under a receiver. An air piston beneath the magazine pushes the stack up into the receiver, then retracts. A pick-up dips into the receiver, lifts a blank to the carriage level of the press. There grippers move it through the press.

Rough-drawn shells emerge from the press onto a short, inclined-belt conveyor. This conveyor carries shells to the top of a chute where the shells are divided into two lines. The next step is washing, followed by annealing. Two lines of shells shorten washer length. From the washer, each line feeds an annealing furnace.

The lines leaving each furnace merge with a main conveyor. An electric eye at the intersection of the conveyors prevents jam-ups. The main conveyor then takes the shells through a "soaping" machine and delivers them to a zig-zag storage bank.

The zig-zag conveyor retraces its steps in a limited space. It is designed to give annealed and soaped shells time to cool, and to provide a storage bank ahead of the final sizing operation.

Final step is to take shells from the storage bank, load them into the sizing press, unload them, and send them along a gravity-roller conveyor to subsequent operations.

Automation, in a limited sense, is the basis of this setup. All that is lacking for a full automated system is a single control point—with the operator remaining in one place and relying on electronic switches and connections.

R.C.Allen Business Machines

FOR MODERN BUSINESS NEEDS

The superb R. C. Allen VisOmatic stands out as the world's most advanced typewriter. With exclusive VisOmatic (*visible* and *automatic*) Margins, keyset tabulation, interchangeable platen, long-life ribbon, and many other outstanding features, R. C. Allen typewriters are preferred for all business typing. Yet, they cost far less than you would expect for such superior performance. Available with Spanish, French, German, Italian, and other language keyboards, as well as English. Carriage widths from 11 to 26 inches.

R. C. ALLEN CASH REGISTERS

provide complete protection, convenience, and business information. There are manual and electric models designed for every type of retail business, and all R. C. Allen cash registers are *two-in-one* machines. They can be used as an adding machine as well as a cash register, and are unequalled in features and value. Multiple-total and multiple-drawer models are also available.

For full information about R. C. Allen Typewriters, Cash Registers, Adding and Bookkeeping Machines, call your nearest R. C. Allen Dealer. Distributors are located in principal cities throughout the world.

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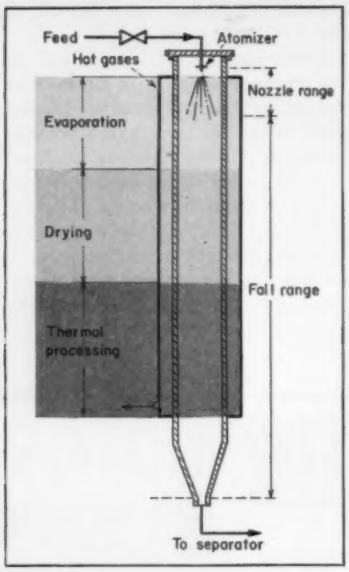

New Tower Handles Three Process Steps

Digested from CHEMICAL ENGINEERING, Dec, p118

This new one-tower process seems slated for future stardom. It is called "atomized suspension" by its inventor, W. H. Gauvin of McGill University, Montreal, Canada.

The new technique grew out of a 3-year research program sponsored by the Pulp and Paper Research Institute of Canada. Twenty Canadian companies backed the program financially.

The method offers an economical means of evaporating, drying, and thermal (heat) processing of solids from slurries or solutions. The equipment is compact. It is simple and easy to control.

Atomized suspension is carried out in a jacketed tower chamber operated as a down-flow unit. The hot feed solution enters the chamber through a pressure nozzle that produces droplets with average diameters of 0.025 to 0.030 millimeters.

The 1100° to 1500°F. temperature of the tower wall then causes the evaporation, drying, and thermal processing actions. The steam leaving the tower is stripped of solids, condensable and absorbable fractions, and heat. To date, only heat process and oxidation reactions have been carried out.

YOU AND YOUR PERSONAL AFFAIRS

For personal investments, most people think only of the usual stocks, bonds, and real estate. But many combine their investment plans with an intriguing hobby—collecting paintings. That, plus museum demand, is why the international art market is booming as never before. Prices are high, competition is intense, especially for the "old masters."

You may find investing in paintings difficult and costly. But the returns can justify the trouble. Consider Vermeer's Portrait of a Young Girl. It recently sold for $350,000; in 1816, it sold in Rotterdam for the equivalent in current dollars of $1.80.

Matisse was selling his paintings for about £100 in 1915. In 1954, the Tate Gallery paid 6,700 guineas ($19,700) for his Portrait of Andre Derain; the same picture sold for $1,400 in 1928.

What do you look for? It depends a lot on what you can afford. The old masters—Van Eyck, Rubens, Van Dyck, Rembrandt, Vermeer, Botticelli, Raphael, El Greco, Velasquez, altogether about 250 of them—are expensive, with prices varying widely.

Many art collectors believe that they can find better investments in the paintings of the "Impressionists," the "post-Impressionists," and certain modern artists. Names to remember: Degas, Picasso, Matisse, Derain, Cézanne, Gauguin, Seurat, Signac, Vuillard, Toulouse-Lautrec, Pignon, Werner, Bacon, Scott. And when you buy, do so through a reputable art dealer.

✦ ✦ ✦

Air travel is routine for most executives. But not all who fly are happy about it. Even air-travel veterans often have a lurking sense of anxiety.

The airlines for years have been aware of this. The result: a pamphlet distributed by International Air Transport Association. Its conclusion is that while airline employees have the major responsibility for relieving passenger anxiety, passengers can do much for themselves.

How can you best avoid this frustrating anxiety? If you are making your first flight, tell the stewardess so. If you do not understand any of the directions, ask for a fuller explanation. Watch out for any unusual tendency to complain about minor flaws in food or service—it means anxiety is getting a hold on you. And do not be ashamed of your anxiety; just accept it and try to overcome it.

✦ ✦ ✦

Jewelry, like everything else, needs cleaning often. For gems and diamonds, scrub with a small brush in a soap or detergent lather, rinse, and dry. But never clean pearls with water. They should be wiped with dry chamois or tissue after being worn. Clean between dirty pearls with a soft brush.

YOU has been compiled from American Business, Business Week, Factory Management & Maintenance, and other sources.

Big shopping center is going up near New York. Famous Macy's department store will move in

Retail Selling Headed for Change

Digested from SALES MANAGEMENT, Nov 10, p65

The next 10 years will see great changes in the art of getting goods into the hands of customers. Between now and '65 you can expect to live through a revolution in retailing. You will weather the storm—profitwise—only if you catch the fast trends that develop in your industry.

Here is a brief review of six major areas in which the competitive meaning of the term "retailing" will change radically in the next 10 years:

The supermarket is an unsettled institution. It is still expanding, experimenting and changing. In spite of growing pains, however, the supermarket will remain essentially what it is today—a distributor of food, with "side lines" added to help cushion the low profit margin on which it must operate. It will grow in size and importance, per store and as a marketing industry. But its basic form will not change. It will continue to add streamlined refinements in mass retailing.

Shopping centers like the one above are spreading fast in the U. S. and, to a lesser degree, in many other countries. Growth will continue, despite some over-building, some poor choices of location, and a lot of inefficient organization and planning.

Years ago people migrated from rural areas to cities. Families sought the security of urban employment and closed-in city life.

Now the movement of people is in reverse—from city to suburbs. The stores, of course, must follow. Shopping centers are the only sensible answer. By 1965 the growth of shopping centers will have stabilized.

Downtown city stores will thrive on a more modest level. They will tend to discard lower to middle price ranges in favor of middle to upper price ranges—plus specialization.

The department store is undergoing a drastic change. It is breaking up into small stores. Only a few of the big names in the big cities will survive. Most department stores will branch into suburban areas with much smaller units. The department store of 1965 will be a multiple-store operation, mostly local, often regional and in some cases national.

More and more branches will locate in huge regional shopping centers. The giant downtown department store will die. The suburban store will be a much more flexible operation than the big city store. Services will range from floor selling to self-service—including cashier check-out. Selling activities will include house-to-house selling in home neighborhoods. Big items like television sets will be sold in homes.

Electronics will make much of the buying automatic. New automatic self-selling units (elaborate vending machines in some cases) will be constantly stocked by automatic conveyors from the basement or storerooms.

Dependence on national brands will be greater, much greater, by 1965. This will mean a closer working relationship between the manufacturer of the branded merchandise and the retailer. National brands will dominate through mass-market advertising. There will be less and less emphasis on small local brands. Retailer brands will die—except a few that belong to nationally known retailers.

Big brand names will make possible greater house-to-house

selling. The customer will depend more on the brand, less on the retailer. Mass-selling invasion of the home, on a big brand basis, will be forced by competition.

Vending machines will play a dramatic part in retail selling in the next 10 years. Today they sell everything from complete meals to hosiery, railroad tickets, cigars, drinks, sandwiches. Tomorrow they will sell many more products in many more ways.

It is not difficult to imagine a machine that will give you a product demonstration, a sales talk, and the product itself, upon the insertion of a coin or metal "charge-plate" (previously issued to the credit customer by the store). Vending machines—which have more than trebled in use in the last 10 years—will reach a remarkable degree of mechanical and electronic perfection by 1965. (See MD, Marketing, Jan)

Auto parking lots, bus and train depots, airports and many other public places will be extensively equipped with coin-slot machines. A great variety of small package merchandise will be sold.

Retail merchandising practice will change greatly by 1965 in two vital areas—"turnover" and "markup."

Turnover of inventory depends largely on stock control. Stock control has been a serious weakness in retailing for many years. But in the next few years, electronics will change the picture. New electronic computers will control stock automatically—not only on the retail floor, but in reserve stockrooms, in the retailer's warehouse, and even in the wholesaler's and manufacturer's warehouse.

An electronic machine, for example, could flash a signal to the distributor, as well as to the retailer's stockroom, indicating a low stock level.

When automation takes over stock control there will be no more cut-of-stock trouble, nor lopsided stocks, nor "lost" sales. The result: faster turnover, better profits for the retailer.

Markup—the difference between the cost of an item to the retailer and his final selling price—will NOT be supported at a high level in the next 10 years. Cost will go down due to cheaper manufacturing, cheaper distribution, and cheaper selling methods. Automation, of course, will be the basis of many of these cost reductions. The result will be a drastic lowering of traditional markups and fiercer competition.

The trend toward lower markups has begun and will move faster in the years ahead. The concept of thinking of markups as percentages will give way to figuring them in terms of cash—dollars and cents, pounds and shillings, etc.

The goal of business in 1965 will be to make more goods available to more people than ever before. The businessman who can think in terms of volume for profit—instead of markup for profit—will lead the field.

Greater efficiency and more automation will bring costs so low that the producer and the retailer will make more money by selling *more units at a lower cost per unit.* That is the competitive trend as it appears today.

5,000 sq. feet per hour

THE NEW SELF-PROPELLED 'EAGLE' SCRUBS, RINSES AND DRIES LARGE FLOOR AREAS IN ONE OPERATION

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To see the new 'Eagle' at work on the floor of a factory canteen or store is to discover a completely new standard of floor maintenance efficiency. Here, indeed, is a machine which is the complete answer to the rapid cleaning and the preservation of large floor areas. The 'Eagle' scrubs, rinses and suction dries at a slow walking pace leaving the floor behind it clean, dry and ready for *immediate* use. Being self-propelled the 'Eagle' has virtually only to be guided and can thus be used all day by female staff without fatigue.

For complete information about this and many other time, money and labour-saving machines for floor cleaning, maintenance, protection, write to

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"Consumerism" Concept Welcomed in Far East

Digested from AMERICAN LETTER, Nov 26

Seven U. S. sales executives back from a trip to the Far East report that Asians are eager to adopt the latest theories of selling. The new sales concept — "consumerism" — has aroused special interest.

Put simply, the consumerism idea is that a country's standard of living depends on how much the domestic consumer is willing and able to buy. The businessman's big effort, says the theory, should go into developing domestic markets.

The traveling Americans pointed out to the Asians that when the U. S. was a new nation it faced the same problems that confront the Asian countries today. The U. S. met the challenge by producing goods for the home market—thus raising living standards—and relying less on export trade. The Americans suggested, and Asian businessmen agreed, that one first step toward consumerism would be to expand consumer credit in Asian countries.

For further information about "consumerism" and other techniques and sales theories, write to National Sales Executives International, 136 East 57th St., New York, 22, N. Y. The group, representing 2½-million salesmen, is interested in promoting ideas—not selling U. S. goods. Their information service is free.

▶ New

Manufacturers report that they are amazed by the unusually heavy sale of certain new products. The public, apparently, needs little or no time to grasp an item that is really new and different.

Quick-recovery water heaters, electric frying pans, portable television sets, transistorized radio sets—these are examples of fast-moving new items. One electrical appliance executive says: "80% of my business in the next 10 years will come from products that are not even on the market today."

Digested from ELECTRICAL MERCHANDISING, Dec, p4

(Advertisement)

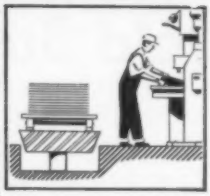
FOUR WAYS TO CUT MATERIALS HANDLING COSTS

Case Histories show how to use "Lift-Portation" for truck loading, machine feeding and heavy lifting.

by ARGUS LEIDY, *Vice President in charge of Export*

To maintain profits in the face of the rising costs of our expanding economy, economists forecast the need of a 3% increase in productivity per man each year. Because manufacturing consists largely of movement of materials, a study of material handling methods will indicate many clues to sources of this increased productivity.

MACHINE FEEDING

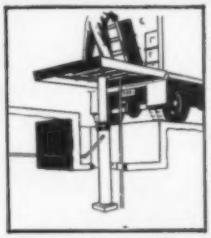


In Washington, D. C. a large printing company studied the manual stoop . . . turn . . . lift . . . twist required to remove paper stock from a skid and place it in position on a power-driven paper cutter.

To speed the operation, the skid is now placed on a Globe Production Lift installed alongside the paper cutter. Manual lifting is completely eliminated. The operator, by push-button control, raises the paper to cutting table level and slides a heavy load of paper under the blade with little effort. As the paper level goes down, the platform is inched upward.

Production increased approximately 30% after installation of Globe Lift.

TRUCK LOADING

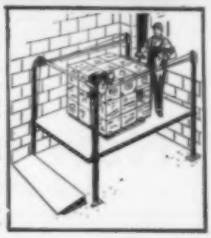


A one-story ground level branch warehouse and service station was faced with the frequent need to load and unload fork lift trucks, weighing from 1½ to 8 tons. Without a loading platform, each operation was slow and hazardous.

When a Globe Loading Lift was installed, fork lift trucks were run onto the platform at ground level, lifted and then run onto the truck.

Loading and unloading that previously took hours is now completed in minutes.

ELECTRO-LOADER



A maintenance department in a medium size plant was located 3 feet below ground level. Supplies and machines moved into and out of the department by means of a ramp. It was slow, laborious work.

By replacing the ramp with a Globe Electro-Loader, traffic was speeded and muscle power was eliminated.

The Electro-Loader is installed on the floor. No excavation was necessary. Powered by an electric motor, the platform travels between floor and ground level by push-button control.

TRANS-O-MATIC RAMP

The shipping dock of a large paint factory in Buffalo, N. Y. was continually jammed with trucks. Often trucks waited to load and unload. While the dock was "standard" height above road level, most truck bodies were too high or too low for hand trucks to roll smoothly in or out.

Three self-leveling Trans-O-Matic Ramps were installed so that each truck bed, high or low, was provided with an easily traversed ramp. Loading and unloading was speeded by as much as 50%. Lost time from spilled goods and breakage was eliminated. No longer do trucks wait for platform space.

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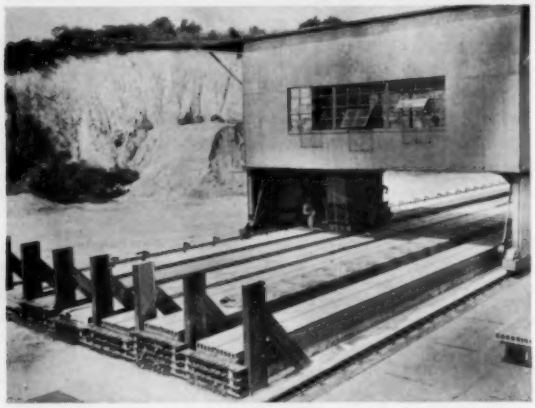


Plant Extrudes Concrete

A new process produces concrete planks like toothpaste being squeezed out of a tube. German in origin, the process is licensed to West Allis Concrete Products Co. (Milwaukee, Wis.) for the Western Hemisphere.

Slabs can be produced in widths of 20 or 40 inches. Panels or slabs are cast in a continuous plank 330 feet long by means of a slip form built into a gantry crane that spans the casting beds. Concrete can be placed in any one of six parallel casting lanes. A concrete saw later cuts the planks to desired lengths.

The casting machine shapes tongue and groove edges, vibrates concrete, positions pretensioning wires. —Engineering News-Record, Nov 24, p40

New Ideas Hold Builders' Interest

Digested from AMERICAN BUILDER, ARCHITECTURAL RECORD, CONSTRUCTION METHODS & EQUIPMENT, ENGINEERING NEWS-RECORD, INGENIERA INTERNACIONAL CONSTRUCCION

The construction industry is by no means a static industry. New materials, techniques and processes continually appear. Here is a roundup of some of the new ideas sure to capture and hold the builder's eye.

Poured concrete houses with 750 square ft. of living space and selling at $6,000 are no rarity in Puerto Rico. Las Lomas Development Corp. turned out six such units per 8-hour day at a 1,600-home project near San Juan. (See MD, Nov '55, p11)

Key to the fast and economical construction of the five-room and bath dwelling is a huge steel form in which walls and main partitions for a complete house are cast monolithically. It takes only 1½ hours to strip, clean, set and tie the form; 45 minutes to make the pour. Six forms let six houses be poured daily.

Walls, 5 inches thick, are cast in place atop previously poured 6x30-inch foundation walls that are integral with a 4-inch floor slab. Then, after walls are stripped, another steel form for some thin and complicated interior partitions is placed and poured. Lastly, a 4-inch precast 25x38-foot roof is lifted on.—Construction Methods & Equipment, Dec, p62

Electric heating is just now showing signs of a bright future—at least in the U. S. As cheaper electric power becomes available elsewhere, electric heating is sure to grow in use.

Builders are especially interested in the individual room systems of heating with resistance elements. Without a central system, the builder can save costs of chimney, furnace, ducts, registers and all the valuable space they consume. Individual panel thermostats afford the ultimate in zone

Coming: An All-Plastic House

Molded-plastic modules will form the rooms of Monsanto Chemical Co.'s demonstration and test house shown above.

Modules are 8 by 16 feet in plan and are bent to form a one-piece ceiling, wall and floor. In the simplest plan, eight modules are cantilevered in pairs from a 16-foot-square central utility core to form four 16-foot-square rooms. The modules permit a variety of floor plans to suit individual needs. Monsanto feels the molded module may eventually lead to a truly "mass-produced" house.—Ingeniera Internacional Construccion, Dec, p39

control. And the arguments of cleanliness, simplicity, and freedom from maintenance cost presented by electric heat go well with buyers.

With no moving parts, resistance units last indefinitely and are easily installed. Compared with gas or oil heat, long-term costs are hard to fix. One manufacturer reports frankly, "Electricity at 1½¢ per kilowatt-hour is approximately three times as expensive as the cost of producing that same amount of heat with oil, coal or gas." But that's as of now. Any change in the electric-energy picture will be toward cheaper and more plentiful power.—American Builder, Dec, p74

Better structures at lower cost—that's the aim of the recently published revised U.S. federal building standards. And in these standards are some cost-cutting tips for designers anywhere in the world.

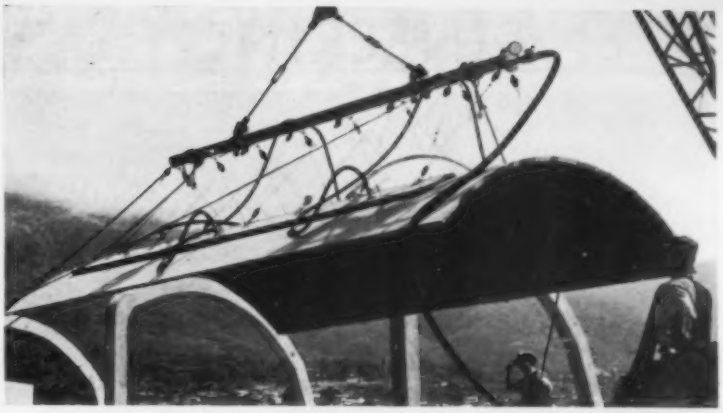
The General Services Administration and its Public Buildings Service have adopted the changes in basic standards and specifications to take advantage of advances in commercial practices. Here are a few of them:

• Build with blocks—Of greatest general interest are recommendations on functional design of office buildings. For efficient utilization of large areas of floor space in office buildings, the new standards propose a module of 25x24 feet for office layout.

• Do not waste space—To reduce the amount of space used for the core of the building, the new standards put special emphasis on corridors, air conditioning and elevators.

Minimum acceptable width of corridors is reduced to five feet. The standards recommend consideration of high-pressure air-conditioning systems along with radiant cooling to reduce duct size and space requirements for equipment. Elevators should have the largest cars justified by the building and the maximum possible interval between cars.

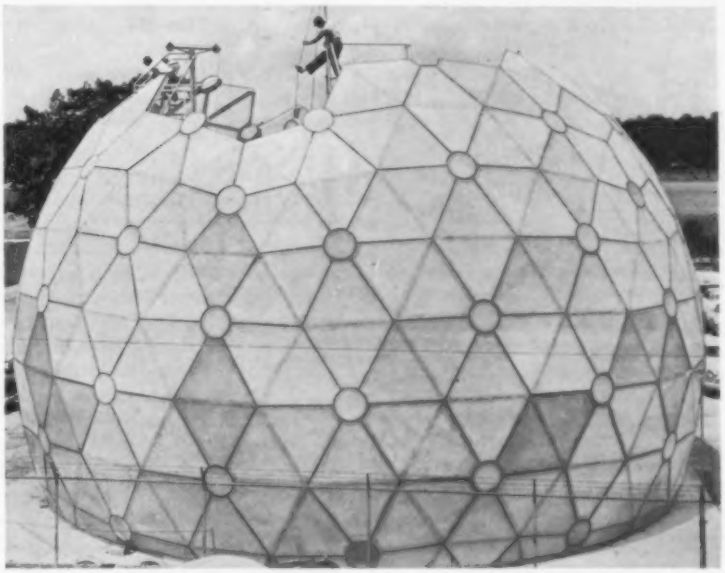
• Do not waste vertical space either—Floor-to-ceiling height will be held to a minimum. A height of 8½ feet is recommended where lighting fixtures are recessed.—Engineering News-Record, Dec 8, p28



Thin-Shell Roof Speeds Erection

From footing to roof in 15 days—that's what happened when the contractor (Vacuum Concrete de Venezuela, C.A.) used precast frames and thin-shell roof panels to build cabanas in Caracas, Venezuela.

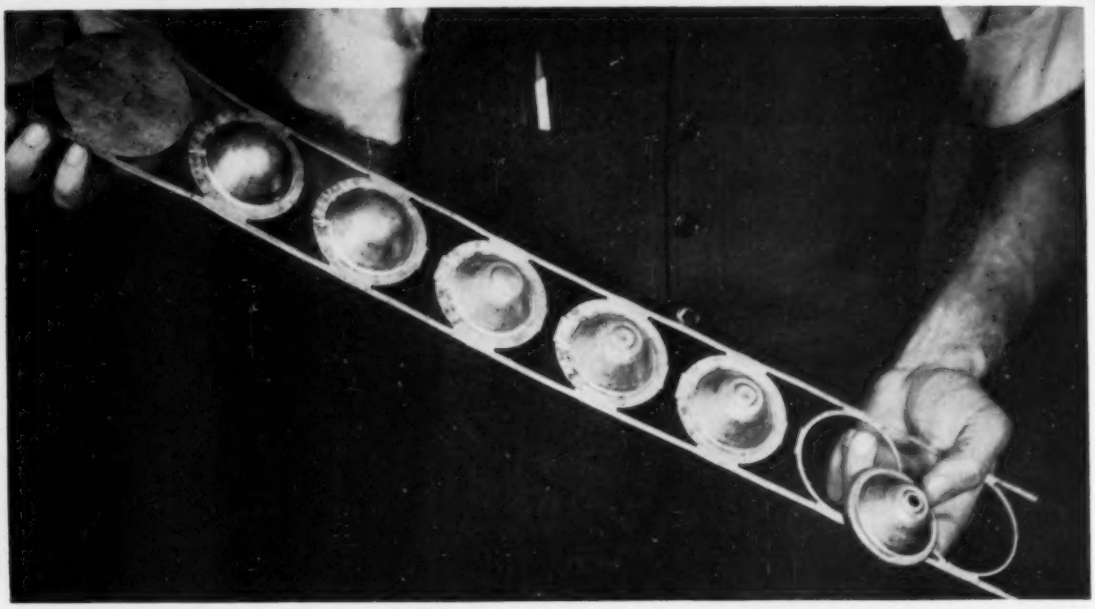
Curved roof sections were precast at the rate of two a day and were erected by a special vacuum lifter that gave temporary support to the thin members. Panels are 1½ inch thick. The roof panels function as a curved beam not as an arch.—Engineering News-Record, Nov 17, p55



Largest Geodesic Dome Undergoes Tests

Buckminster Fuller has built another dome. This time it is a record-breaking 55-foot-diameter three-quarter sphere fabricated entirely of reinforced plastic. It is the world's largest rigid plastic structure. Lunn Laminates Inc. fabricated the plastic panels.

The dome is a prototype of shelters to be used for military purposes. Geodesics, Inc., designed it to withstand 200-mile-per-hour wind stresses, arctic snow loads, extreme cold and heat and other hazards of extreme latitudes. The dome consists of 363 components in the form of diamond and circle "cakepans," the flanges of which are bolted together through predrilled holes. Total weight is only 6 tons.—Architectural Record, Nov, p235



PRESSURE-SEALED CAP for automobile gasoline tank is stamped from strip steel zinc-coated by continuous galvanizing. Strip withstands deep drawing without damage to the coating. It's one reason engineers should know . . .

How to Specify Zinc Coatings

Digested from PRODUCT ENGINEERING, Dec, p158

If an engineer must specify protective zinc coatings for steel, he must consider how they are to be applied and the special advantages and disadvantages of each type of coating. Five methods are used to apply the coatings.

1. Hot-dip galvanizing is the most common method. The steel is cleaned, then dipped into molten zinc. When the metal is withdrawn, the zinc solidifies on its surface in a continuous, uniform coat. Only one coating is applied.

2. Continuous galvanizing is an outstanding development in hot-dip galvanizing. It increases production at reduced cost and improves the product's quality. The coating is highly uniform, and its thickness can be controlled easily.

Adding aluminum to the galvanizing bath produces a highly ductile coating suitable for deep drawing or spinning operations. Continuous-galvanized strip can be deformed to the full extent of the steel base without peeling.

3. Electrodeposition of zinc on steel can be done continuously or batch-wise. The zinc coating has excellent adherence and ductility, and provides a good base for paint.

An important advance is the introduction of bright zinc coatings. The piece plating trade has adopted this process widely because it provides an attractive metal finish for such parts as refrigerator trays and hardware.

4. Sheradizing is applied to small parts, such as nuts, bolts, washers. They are packed with zinc dust in an air-tight container. Excellent penetration and distribution allow treating irregularly shaped and hollow articles containing screw threads and holes without building up on corners or filling in depressions.

5. Metallizing applies zinc to a surface by spray. Zinc wire is passed through a spray gun and melted in an oxyacetylene flame. A blast of compressed air atomizes the molten zinc and projects it against the surface of the steel product.

Metallizing has proved useful in coating transformer cases, laundry baskets, and processing equipment such as degreasers and clay drying rolls. Recently, organic coatings—vinyls, epoxies, and phenolics—have been used in conjunction with zinc coatings.

Each type of coating has its own particular advantages and disadvantages. Galvanized coatings are low in cost. They have good dimensional stability and provide full corrosion protection as every nook and cranny of a product are coated. They should not be used when exposed to acids.

Electrogalvanizing is particularly useful for protecting wire and strip or small delicate parts not easily handled by other methods. It provides greater control of uniformity than any other method. Sheet surfaces can be coated on one side only if desired or masked for partial application of the zinc. While electrodeposition is not the cheapest method, it is usually specified where thin

zinc coats are satisfactory and exposure conditions not severe,

Sheradizing is adaptable to small parts where appearance and durability are not crucial. Such coatings are suitable for protection against mild corrosion.

As metallizing allows very thick coatings to be applied, the product can be made to meet the most severe corrosive conditions. Any size part can be metallized, but the process should be used only where coating porosity is not critical. Coating porosity is an advantage in paint adherence.

When an engineer specifies coating thickness, he must realize that the amount of protection depends on the thickness. The heavier the coating, the longer the rust-free life of the base metal.

Coatings are usually specified by weight per unit area, as in ounces per square foot of surface or, in the case of sheet coated on both sides, ounces per square foot of sheet. A coating of 1 ounce per square foot corresponds to a thickness of 0.00174 inch.

➤ New

A magnetic refrigerator that will maintain lower temperatures than any previous apparatus has been developed by Arthur D. Little, Inc. (Cambridge, Mass.). The design is based on a cyclic principle of magnetic cooling originated by Daunt and Heer of Ohio State University.

A plastic capsule 3 inches long contains a special chemical salt as the refrigerant. Operation, controlled entirely by external magnetic fields, depends on cooling of certain metals when demagnetized.

While this principle has been used for several years in low-temperature laboratories, this is the first apparatus that can maintain extremely low temperatures (near absolute zero—459.6°F.) for long periods of time. It is believed to be the first commercial application of "superconductivity"—the change that certain metals undergo at very low temperatures at which they lose all resistance to passage of an electric current.

Digested from AMERICAN MACHINIST, Nov 21, p169

New Radiation Tool for Chemical Processing

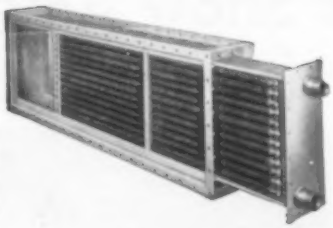
Digested from CHEMICAL WEEK, Dec 3, p58

Limited penetration is proving a big handicap to direct radiation machines, such as the Van de Graaf and resonance transformer, in their attempt to process chemicals. But a comparatively new device, the traveling-wave linear accelerator, features higher voltages and higher penetration of matter (up to an inch).

Late in November, High Voltage Engineering Corp. (Cambridge, Mass.) sold what is thought to be industry's first linear accelerator. It will probably be used for sterilization of drugs.

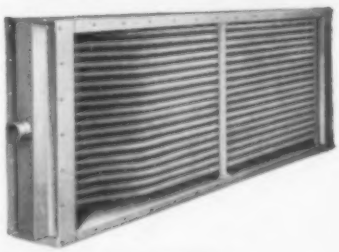
Most promising chemical-processing uses of linear accelerators are polymer synthesis, polyethylene irradiation, production of benzene hexachloride for insecticides, and polymerization of ethylene.

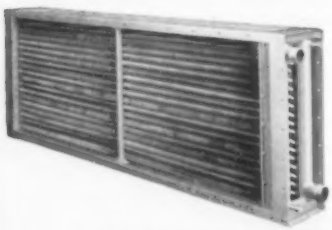
Heating and Cooling Coils for every need



HEAVY-DUTY COILS — for industrial and process heating. Handle pressures up to 350 lbs.; built for easy maintenance; highly resistant to corrosion. Request Bulletin B-1318.

HEATING COILS — wide range available for blast heating, zone reheating, modulated steam control, steam or hot water. For further details send for Bulletin B-1218.





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SILVER WRAITH by Rolls Royce is still tops. Cost: about $18,000.

SUNBEAM RAPIER sports a new two-toned color look. Overdrive is standard equipment. Engine has an 8:1 compression ratio and is rated at 62 horsepower.

Europe's Cars Show Advanced Styles

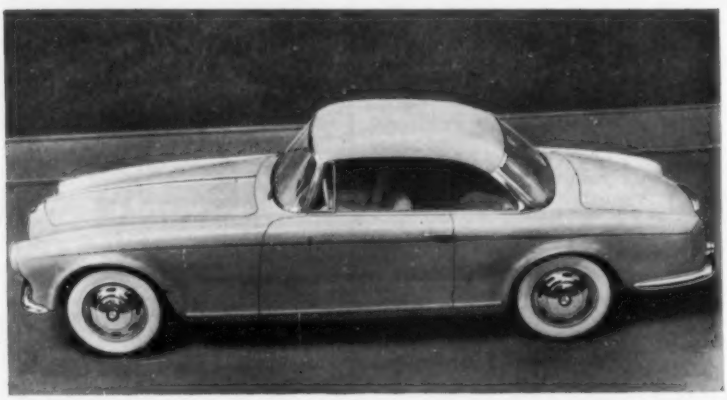
Digested from THE AMERICAN AUTOMOBILE, Dec, p35; BUSINESS WEEK, Oct 29, p146

Story Begins on Next Page

CITROEN puts directional signals at upper corners of rear window.

AT PARIS AUTOMOBILE SHOW, Citroen was the biggest attraction. It offers hydraulic operation for suspension, brakes, steering, clutch, and gearshift.

FORD SQUIRE emphasizes growing trend toward station wagons in Europe.



GERMAN BMW model 503 breaks away from concentration on small cars and trucks. V-8 engine provides 140 horsepower. Speed is over 100 miles per hour.

Europe's Cars Show Advanced Styles

Europe's automobile shows traditionally usher in the coming year's new models. On the whole, Europe's cars are leaning heavily on curvier styles, more streamlined shapes. Most cars are powered by four or six-cylinder engines—few V-8's are available. In other areas, the shows pointed to significant changes.

The Paris Salon sharply reflected the tendency toward mergers seen also in England and in the U.S. French exhibitors numbered only five manufacturing companies, though many more car and truck names than that still remain. The reason: financial troubles and sales problems.

London's annual motor show was an eye-opener for Britain's car manufacturers. The show's biggest attractions were not the new models shown by the British, but the French, German, and U.S. displays. While Britain will hold its second place this year among the world's automobile makers, the signs pointed toward trouble in holding the top place in export.

British car makers seem to be aware of the fight they face. But most people asked are they really prepared to fight. No British producer showed a small car that could compete with Germany's Volkswagen. And Britain again ignored not only Continental but the latest U.S. trends and practices. There were no truly new engineering developments. The new Ferguson car is in an early stage of development—too early to assess its impact. (See other article on this page for details.)

On the other hand, most manufacturers showed they have been thinking about competition. Their use of chrome and color was lavish. They are turning away from conservative paintwork, taking to two-tone styles on the outside and colorful leather inside.

At both Paris and London, the French Citroen stole the show. Its styling is uncompromisingly modern. But it is under the sheet-metal work where you have to look for the radical innovations. Hydraulic power does just about everything.

New Low-Cost Auto Aims at Europe's Market

Digested from THE ECONOMIST (London), Nov 26, p 767

A revolutionary new automobile has been developed in England by Mr. Harry Ferguson, noted designer and inventor in the motor industry. The new auto has remarkable features — designwise and costwise—that could make a big dent in Europe's utility vehicle business.

At present, the "radical" design and its inventor are in search of commercial sponsorship. The aim is to interest an established organization that is capable of cheap output by means of mass production.

The new auto uses a chassis system that might be classed "revolutionary"—though the inventor claims it is simple and practical and gives remarkable motoring performance. It is cheap, too, he says.

What is offered to the industry is a light, simple and low-cost motor vehicle with (1) automatic transmission, (2) optional four-wheel drive, and (3) exceptional braking qualities that largely eliminate the chance of a skid. The car has four-wheel independent suspension that produces good road-holding qualities and good performance in mud, sand, etc.

The automatic transmission is what it says—not merely an automatically-operated gearbox. The inventor says it could be produced (on a volume basis) for a third of the cost of American units that are now used in such cars as the Rolls-Royce, Bentley, and Armstrong-Siddeley.

The four-wheel drive is not based upon individual drives or turbines for each wheel, nor is there any question of braking by some reversal of hydraulic force. Braking is by inboard disc brakes fitted to a mechanical transmission, automatically distributing the braking force necessary to each wheel through the axle differentials.

The inboard braking system, eliminating brake drums, lightens the whole chassis and especially the unsprung weight. The four-wheel independent spring system uses vertical coil springs. Various engine locations have been tried—the inventor has been concerned with the effect on weight distribution and road-holding qualities.

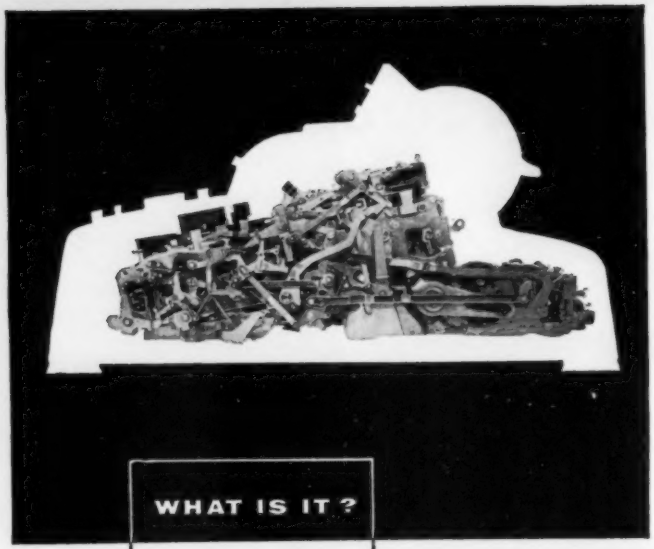
Four models have been designed: (1) An ultra-light military version, with a motor-cycle engine, built to carry four men who could if necessary lift it over a wall. (2) A larger, jeep-style military vehicle that gives good performance on rough ground. (3) A civilian utility car, "with performance comparable to a jeep." (4) A 4 to 5 passenger car for general family use.

Cost estimates are low. Automatic transmission and four-wheel drive, to automotive engineers, ordinarily sound expensive. But the company's cost estimates suggest that, given volume production, this car could be produced at a cost comparable to the medium-size popular cars or even slightly below.

At such a price—if all mechanical claims proved to be valid—the car would offer safety and convenience superior to far more expensive autos that are above the "popular" price range. Ferguson's family model has recently been improved to run further than 30 miles per gallon.

The reaction of the English motor industry, thus far, has been uncertain. The companies have postponed their decisions to study the questions of saleability, ease of manufacture, etc. They are cautious, to say the least, about adopting basic design changes. Meantime, it is clear that Ferguson wants a major motor company to produce his cars—a British one.

It seems likely, though, that if the inventor is unable to find a suitable British company, he will go abroad to find local producers that would build the cars for their areas. He did this in 1940 when he went to Detroit with his tractor system.



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Train Runs "By Itself" In Remote Control Test

Digested from RAILWAY AGE, Dec 12, p50

The trend toward high-efficiency transportation—a vital factor to the businessman—is illustrated by a remarkable new development in railroading. "Remote" radio control of a full-size train was demonstrated recently, for the first time in the U.S., by the New Haven Railroad, in New York.

The single passenger car was test-run 7½ miles. For the demonstration the rail line and the car were equipped with an inductive type contact system for operating the car, with automatic train control, and an inductive type two-way telephone between the wayside control point and the car. The train was started and stopped and run in both directions without an operator in the cab.

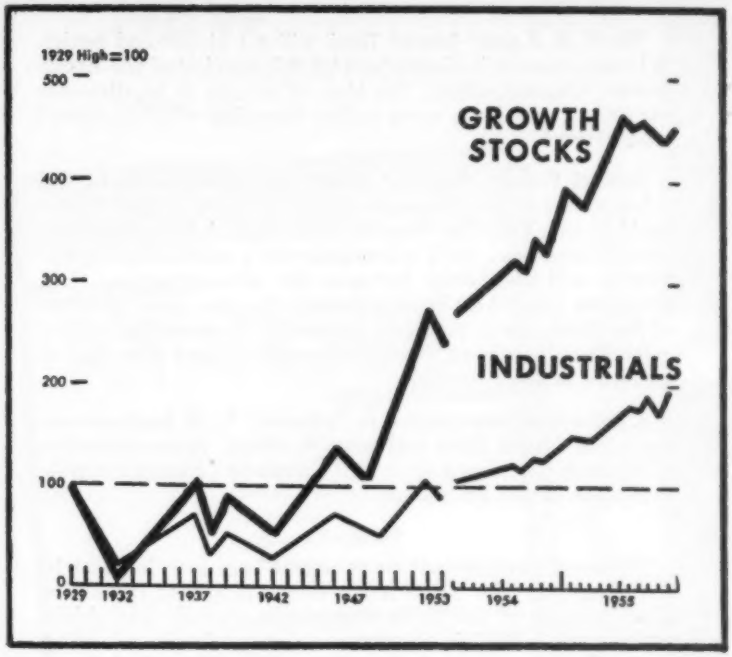
The radio control equipment—which could make freight handling quicker and cheaper—is a recent development of Westinghouse Air Brake Co. It is similar to new equipment that has been tested by the French National Railroads. In the French test an electric train was run at speeds up to 75 miles per hour along one section of FNR mainline.

New

New York harbor will have new and improved shipping facilities in the next year or so. Two miles of Brooklyn waterfront will be rebuilt at a cost of $85-million. Port Authority plans call for replacement of 26 obsolete piers with 10 large, modern structures.

While the new piers will provide only 25 vessel berths instead of the present 44, cargo-handling capacity will be greater. Easy ship handling and better usage of motor trucks, plus more space per pier, will make cargos move much faster. The new piers will handle about 25% of the port's foreign-trade cargo, compared with 17% today. Forty-five acres of open paved area and 25,000 square feet of new warehouse space also will be provided.

Digested from ENGINEERING NEWS-RECORD, Nov 3, p26



Performance over the past 25 years has convinced New York stock-market observers that "growth stocks" provide the safest answer for security-minded investors. They lack glamour and short-term appeal, but they hold promise for the future.

Growth Stocks for Long-Term Security

Digested from BUSINESS WEEK, Nov 26, p134

You may be interested in U.S. stocks, or considering an investment at home through your local stock exchange. In either case, a review of what Wall Street thinks about American "growth stocks" should suggest an idea or two that might well prove profitable.

Growth stocks are the investor's best friend—especially the investor who is planning for the future. That is Wall Street's opinion in a few words. The opinion is unanimous in a locality noted for its differences.

Wall Streeters will tell you that growth stocks are often dull and colorless. They will point out that for the quick-profit investor, and for the high-income investor, growth stocks usually offer little attraction.

But then they will add, very clearly: "Growth stocks are the way to long-term security—the best investment on the market."

For supporting data, New York financial people point to the average and the performance of individual shares. The chart above shows Moody's average of 20 growth stocks over the past 25 years. Today the average increase in value is 355% above the peak year 1929. That gain is about 3½ times the gain shown by Standard & Poor's stock index which covers 50 stocks representing a cross-section of market listings.

Individual growth stocks show sensational gains; for example: Sears, Roebuck stock bought for $5,700 in 1906 is now worth over $900,000.

Alcoa sold for $470 a share in 1923. That investment has grown into a packet of securities now worth $9,000.

B. F. Goodrich shows a 1939 investment of $1,000 now expanded to $43,000.

The big question, of course, is how to locate a growth stock. Analysis of stocks and companies is necessary. Factors other than earnings must be considered: the record of a company's management in both bad times and good times; the long-term outlook of the particular trade; the soundness of the company's financial structure.

Moody's definition of a growth stock is a good one: "a stock whose long-term trends of earnings, dividends, and market prices slant upward at a pitch (incline) greater than the corresponding trend of the industrial (cross-section) stock averages." Moody points out that such a stock arises from the happy combination of good management and good business opportunity.

For all their virtues, growth stocks present no guarantee of automatic investment success. Like other more speculative stocks they must be chosen carefully and then watched carefully. The fact that growth stocks have the capacity for capital appreciation (increase in true value based on the company's true worth) does not mean that their market price will always advance. They may slump, or even collapse during recessions, though they tend to hold up better than the market generally.

The investor must remember

that the real reward from growth stocks comes through long-term holding—not as short or even medium-term investments. Most growth stocks sell at abnormally high price-earnings ratios. Cash dividends are usually kept low, with the bulk of earnings being put back into the business. Holders must be satisfied with low income yields and await the long-term gain. For short-term gain they are less attractive then other shares.

You can find growth stocks in many industries. It is a mistake to assume that they arise mostly in new lines of business that are destined for "tremendous expansion." They may or may not develop in such new lines as electronics, modern "miracle" drugs, plastics, jet propulsion, air transport, and aircraft.

New industries have a very high mortality rate—the growth stock picture can be shattered. Look for stable, well-established companies with experienced and progressive managements. Look for companies that have pursued sound financial policies through times of prosperity and times of recession. Look for companies that are actively expanding their product lines.

Dividends Down in '56

Digested from AMERICAN LETTER, Nov 26

Stockholders in the U.S. will have received about $10.8-billion in corporation dividends for the year 1955—an 8% increase over '54. Corporate profits before taxes were about $43.5-billion. Earnings after taxes were almost $22-billion—the record high reached in 1950. The gain in profits is a major reason why U.S. business has planned a sharp increase in capital spending during '56.

Stock dividends and profits from overseas operations of American business in 1955 also reached a record. They hit $2.4-billion, compared with $2.2-billion in '54.

In spite of all this, there will be fewer dividend increases this year for U.S. investors. Earnings will be less spectacular. A huge part of 1956 profits "available for dividends" will go into higher inventories and outlays for capital expansion.

▶ FINANCIAL DIGEST

The U.S. Export-Import Bank will get bigger and busier. A loan expansion is planned—with full backing of the Eisenhower Administration. The idea, of course, is to stimulate overseas trade by a more active financing of U.S. export transactions.

Samuel Waugh, "Ex-Im" Bank's agressive president and a former Assistant Secretary of State, believes that Ex-Im could go much further than it has to help U.S. businessmen who sell overseas. He is convinced that a world-wide buyers' market will constantly increase the demand among U.S. exporters (and their buyers abroad) for the credit services of the Bank. He is especially interested in spreading credits more liberally among "small" operators—those who deal in amounts under $100,000.

A drive has been started to "educate" U.S. businessmen about the Ex-Im Bank and what it offers. Representatives of 80 large banks met with Mr. Waugh in Chicago recently to get the campaign started.

✦ ✦ ✦

"Business development corporations" are growing fast in New England. The indication is they will spread rapidly to other sections of the U.S.—and maybe abroad. The object of the typical BDC is to encourage enterprise in a locality by supplying worthy small businessmen with capital funds which they could probably not obtain elsewhere.

The BDC is usually organized by businessmen who would benefit from industrial expansion in their city or state. The organizers buy stock shares in the corporation. Then they search for "members," usually leading citizens and business firms in the community, who will agree to lend the new BDC money. The BDC, in turn, relends the funds to its business borrowers.

The BDC extends long-term credit to the new enterprise—usually for 5 to 10 years, to purchase new equipment, buildings, inventory, etc. (Banks generally will make only short-term loans to the small businessman.) The average BDC rate in New England is 6%. "Members" earn only 2% for supplying funds.

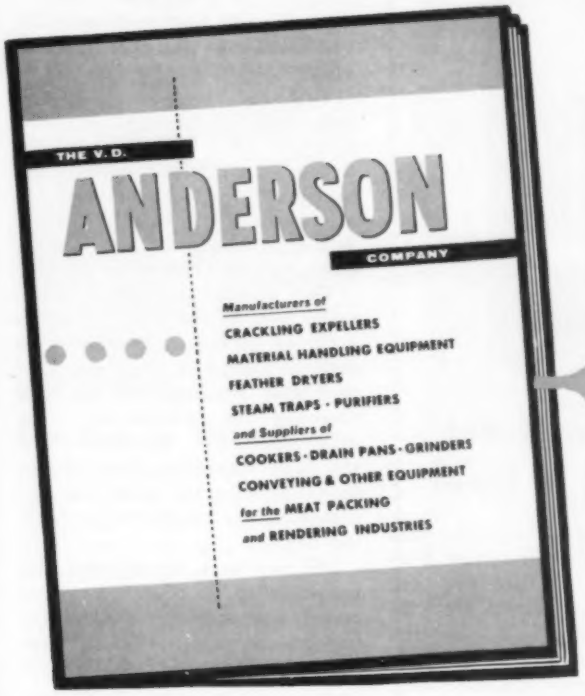
✦ ✦ ✦

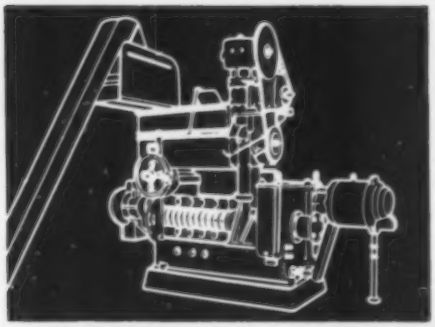
The "bull market" slowed down in Wall Street last year. For 1955 as a whole, the bull (rising) market in New York's financial center advanced about 28.5% for the industrials, 11.9% for rails, and only 6.5% for utilities. This was good, indeed—but not nearly so good as performance in 1954. In '54, industrials and rails each rose almost 50%; utilities gained 18.8%—nearly three times their gain in 1955.

Wall Street men are wondering. They suspect that the best days of the 1949-55 bull market are now in the dim financial past. They are wondering. But they are not alarmed—not as yet. Mostly they look for a gradual settling down of prices, especially in the latter half of '56. "Wait and see" may best describe Wall Street's present attitude.

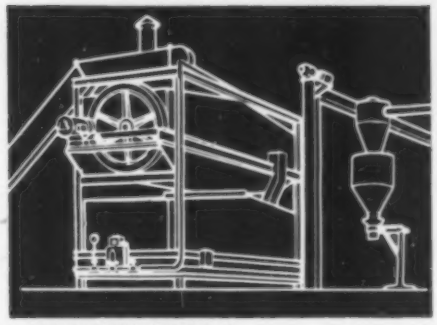
Financial Digest, compiled from various sources, analyzes current financial trends and underlying factors.

NEW
CRACKLING EXPELLER CATALOG





EXPELLERS



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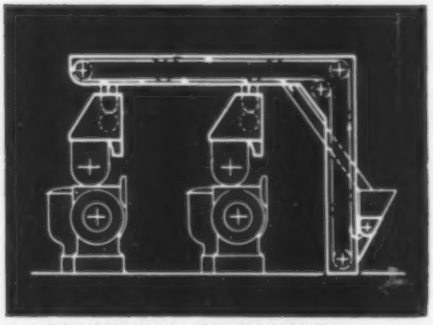

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Air Door Opens Store Front to Street, Makes It Easier for Customers to Enter

The retail trade has struggled for years to make it easier for window shoppers to come inside a store. First came the revolving door—it presented shoppers with less of a chore than doors on hinges. Then came the beam of light which opened the door automatically for the shopper.

Now the Swiss have introduced a doorway that does not need a door at all. There is nothing but space between the outside and the interior of the store. Two big U. S. supermarkets are about to try the doorless doorway.

The Swiss development has an air curtain (sketch above) that eliminates doors for the main entrances of stores. The curtain of air acts as an insulating wall to protect the interior of the stores from outside weather conditions.

Open doorless fronts make it possible for store operators to place their display counters closer to the entrance. This should arouse greater curiosity in passersby, because the absence of doors, in effect, puts them inside the store.

The curtain is operated by blowing a stream of air downward from nozzles placed over the entrance of the store. The air is sucked in through a floor grating that runs along the length of the store. Filters remove insects, dirt, and dust. Waste paper and small particles are collected in a pit under the suction grating. There, they are periodically flushed away by water.

As shown in the diagram, the air is carried through a heating or cooling unit after being filtered and cleaned. It is then moved through ducts to the ceiling and recirculated. The breeze created by air movements will not disturb a person's hat or hair.

Operating costs are estimated at between 15 to 25¢ an hour.

Air curtains are available for different size entrances; but the largest application so far is for a Swiss store with a 40-foot entrance. Folding doors replace the air curtain at night.

The developers of the air curtain, Sulzer Bros., and SIFRAG, both Swiss concerns, reportedly are locked in a fight over patent rights. Each claims it should have exclusive rights. Both companies are selling the idea in the U. S.—SIFRAG through a licensee and Sulzer through a subsidiary. **(Sulzer Bros. Ltd., Winterthur, Switzerland; SIFRAG, Zurich, Switzerland).**

Microwaves Cook Food

An electronic oven for home use employs microwave energy. It broils bacon in 2 minutes; bakes potatoes in 5 minutes; cooks a 5-pound roast beef in 30 minutes; and bakes a 2-layer cake in 6 minutes.

The oven operates on 220 volts and needs no installation. It is equipped with a high-speed electric unit, which can be used for browning meats. Controls on the oven include a high- and low-speed setting and individual timers for microwave unit and browning unit.

The aluminum-lined oven interior is 18 inches wide, 14 inches deep, 11 inches high. Beverages may be heated in cups and food on plates because only the food absorbes the microwaves. The oven reflects the microwaves and the dish transmits them to the food. Neither the oven nor the dishes become hot during the cooking process.

The new oven can be used also for warming baby bottles, cooking cereals and puddings, and defrosting frozen meals. **(The Tappan Stove Co., Mansfield, Ohio.)**

●

Turbodiesel Engines

Two new turbocharged diesel engines, NTO-6 and NT-6, are now available for automotive, off-highway, industrial and marine applications. The NTO-6 develops 262 horsepower while the NT-6 is rated at 250 horsepower. Maximum speed of both is 2,100 revolutions per minute.

Both Turbodiesels are six cylinder, four-cycle engines with a

bore and stroke of 5½ × 6 inches. Compression ratio for both engines is 15.5 to 1.

Turbocharging harnesses exhaust gases normally wasted. It produces an extra 50 horsepower by giving a better air-fuel mixture in the combustion chamber. **(Cummins Engine Co. Inc., Columbus, Ind.)**

●

Saw Cuts in Tight Spaces

Cutting timbers in cramped spaces, such as mines, tunnels, on docks and bridges, is simplified with new pneumatic chain saw, model 2P18.

"Plunge cutting" technique allows the operator to simply "plunge" the round nose of the cutting bar into the timber, then work it up and down to cut completely through. Even if the timber is hemmed in on three sides, cutting can be done.

This one-man saw has a ⅜-inch chain. Cutting bars are available from 18 to 30 inches. **(Mall Tool Co., 7725 South Chicago Ave., Chicago 19, Ill.)**

●

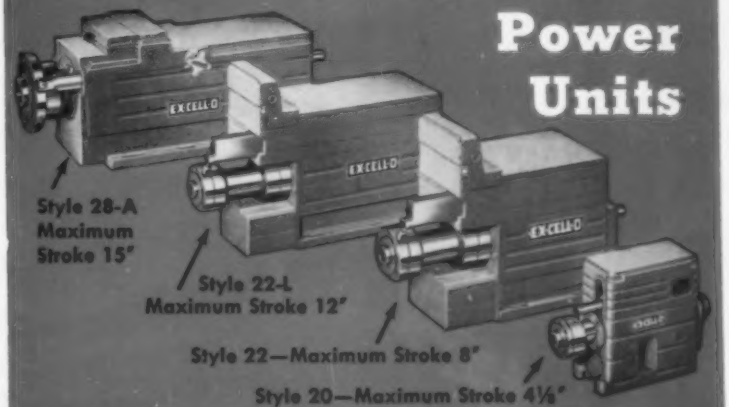
Flow Integrator Unit

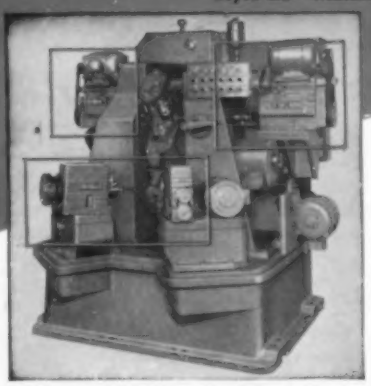
The new F&P multiple flow integrating system, a low-cost highly versatile means for integrating and indicating the total flow of each of a number of process points, provides separate dial counter readings of as many as 20 total flow measurements on a single central station control panel.

The F&P system is unique in its use of a single, compact sensing and computing unit—a sweep pressure generator—to integrate flow of all points feeding into the system. **(Fischer & Porter Co., Hatboro 35, Pa.)**

For High-Production Machines use....

Ex-Cell-O Quill-Type Hydraulic Power Units





This special machine with automatic indexing fixture core-drills piston pin holes and drills angular oil holes. It uses six Ex-Cell-O Power Units (shown without belt guards) operated from a central push-button station.

Ex-Cell-O Power Units feed and rotate tools in easily controlled automatic cycles. A single tool can be held in the unit spindle or a multiple head can be bolted to the quill flange. The Units are used in low-cost, high-production machines for such operations as drilling, reaming, counterboring and spot-facing. A typical machine consists essentially of a plain base, a work-holding fixture and one or more power units.

Ex-Cell-O Units are self-contained and compact; can be mounted horizontally, vertically with the spindle nose down, or at any angle between these positions. For details about these units write, or cable Ex-Cell-O in Detroit.

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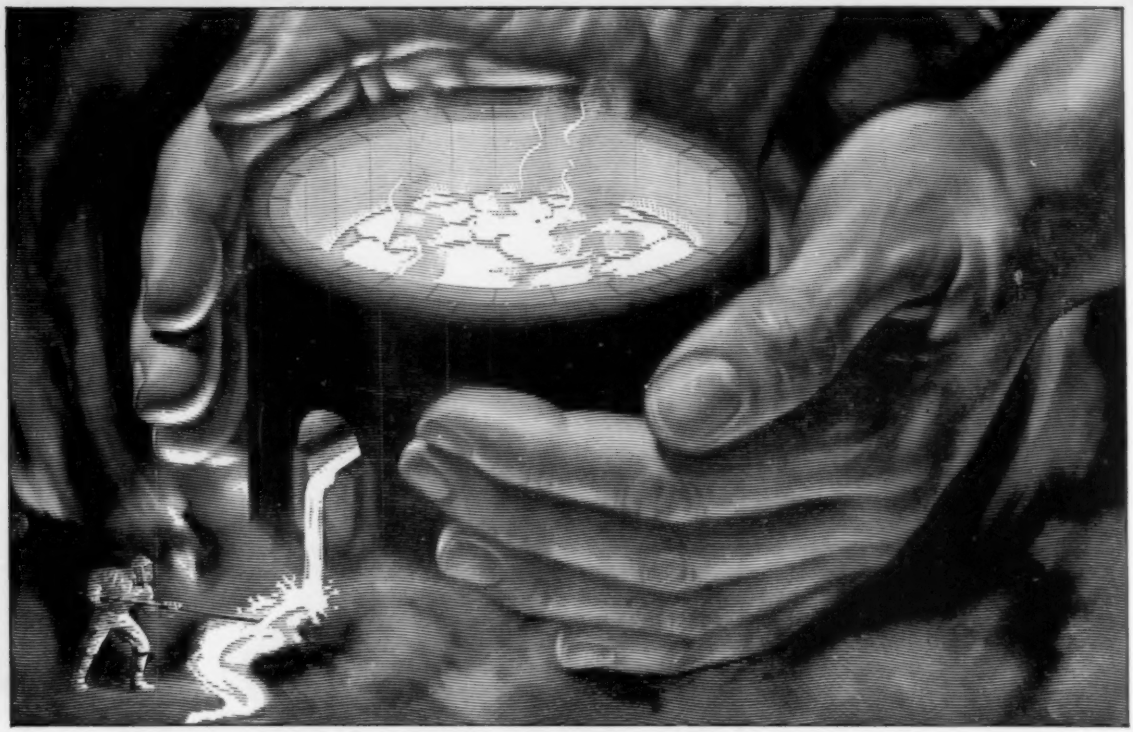

The hotter... the better

Carbon has a peculiar quality—it's at its best when "the heat is on"

IN THE ROARING HEAT of steelmakers' furnaces, molten metals boil and bubble like water in a teakettle.

STANDING FIRM in the intense heat of many of these furnaces are inner walls made of blocks of carbon.

Because pure carbon laughs at heat—actually grows stronger as it gets hotter—it has become vitally important in making iron, steel, and many of the other things all of us use every day.

IN CHEMISTRY, carbon and its refined cousin, graphite, handle hot and violent chemicals that would quickly destroy metal or other materials. Today there are pumps, pipes, tank linings, even entire chemical-processing structures—all made of carbon or graphite.

UNION CARBIDE... AND CARBON—For over 60 years the people of Union Carbide have pioneered in the discovery, development, and production of many carbon and graphite products for both industry and the home. This is one more way in which Union Carbide transforms the elements of nature for the benefit of all.

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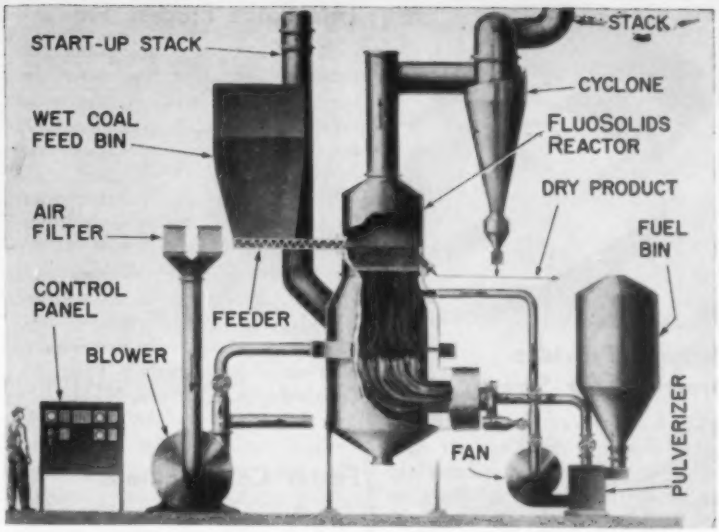
UNION CARBIDE and VINYLITE Plastics • LINDE Welding Equipment • PRESTONE and TREK Anti-Freezes



Fluidization System Dries Fine Coal

The FluoSolids System will dry fine coal without measurable oxidation of the product. Primary component of the coal-drying system is a two-compartment reactor. Pulverized coal is burned in the lower, non-fluidized combustion chamber to produce the necessary heat for drying.

Located directly above is the fluidized drying compartment. Wet coal is introduced into the fluid bed. Coarse, dried product is discharged just below fluid bed level and fine, dried material entrained in the exit gases is collected in a cyclone. **(Dorr-Oliver Inc., Barry Place, Stamford, Conn.)**

New Insulation Resists Breakdown

First application of a new insulation material, Hy-Bute/60, will be in molding high-voltage outdoor instrument transformers (above right, insulation test on left). It virtually eliminates maintenance and susceptibility to mechanical damage. Construction of 15-kilovolt, and above, transformers is now possible.

Hy-Bute/60 incorporates a chemical mechanism built into butyl rubber that prevents formation of free carbon. This prevents formation of a carbon track and consequent failure. Numerous field and laboratory tests have demonstrated the ability of Hy-Bute/60 to withstand the most severe conditions. **(International General Electric Co., 570 Lexington Ave., New York 22, N. Y.)**

Design for living

THE DAILY MAIL Ideal Home Exhibition is Britain's greatest "shop-window" of goods for the home. Last year it attracted a million and a quarter visitors. Every aspect of home life is represented — architecture and building; decorating and furnishing; heating and lighting; the kitchen and nursery; domestic labour-saving; leisure and fashion. The goods on view are the very latest of their kind, and three-quarters of the exhibitors are interested in overseas markets.

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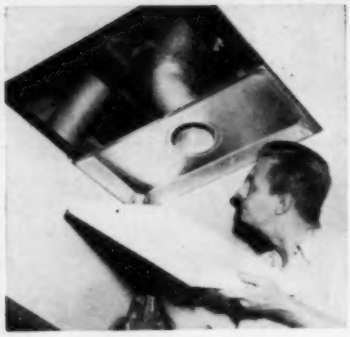

Diffuser Provides Draftless Air Stream

The Multi-Vent air diffuser makes possible draftless air conditioning. It can be completely concealed from view. It offers no interference with light fixtures.

The unit employs a perforated ceiling panel to introduce air vertically into a room. These perforations reduce the high velocity of air traveling through the duct from 1,000 to 1,500 feet per minute to 40 or 50 feet per minute as it leaves the diffuser. **(Pyle-National Co., 1334 N. Kostner Ave., Chicago, Ill.)**

●

New Line of Trucks

A new line of trucks combines style-setting design with rugged power and durability.

S-line model trucks include a wide range of pickup, panel, stake, and multi-stop delivery trucks with factory-mounted added-capacity bodies, farm trucks, truck tractors, fire trucks, school buses, four and six-wheel dump-trucks, and four-wheel-drive trucks.

The trucks are available with either gasoline or liquefied petroleum-gas engines. **(International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill.)**

Integrates Process Flows

Model 14A pneumatic integrator provides continuous linear integration of industrial process flows to within ½% accuracy. It requires no cams for square-root extraction.

The device is weatherproof, dust-proof, and self-purged. It can be panel or field mounted. Gears are replaceable for whatever unit of flow measurement is desired. All circuits are pneumatic; conventional 20-pounds-per-square-inch air or gas supply is required. **(Foxboro Co., Foxboro, Mass.)**

●

Faster Can Making

High-speed bodymaker, No. 403, produces 400 to 450 cans per minute. It handles cans ranging from 2⅜ to 5⅛ inches in height and 2⅛ to 4¼ inches diameter.

Most significant feature of the bodymaker is its compactness. The work table has knurling, notching, edging and prefluxing attachments. **(E. W. Bliss Co., 1420 Hastings St., Toledo 7, Ohio.)**

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New Tractor-Shovel

Model "HAH" two-wheel-drive "Payloader" tractor-shovel has a struck capacity of ¾ cubic yard and a heaped capacity of 1 cubic yard. Especially designed for stockpile work, this new unit has a short turning radius and rear-wheel power steering.

Bucket breakout action permits 40 degrees of tip-back at ground level. The tractor-shovel has a breakout force of 4,500 pounds, a lifting capacity of 4,000 pounds, and a carrying capacity of 3,000 pounds at 4 miles per hour. **(The Frank G. Hough Co., 923 Seventh St., Libertyville, Ill.)**

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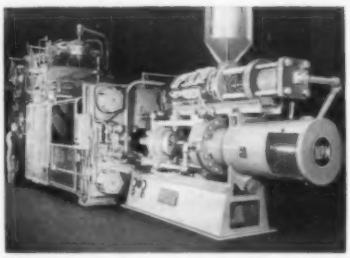


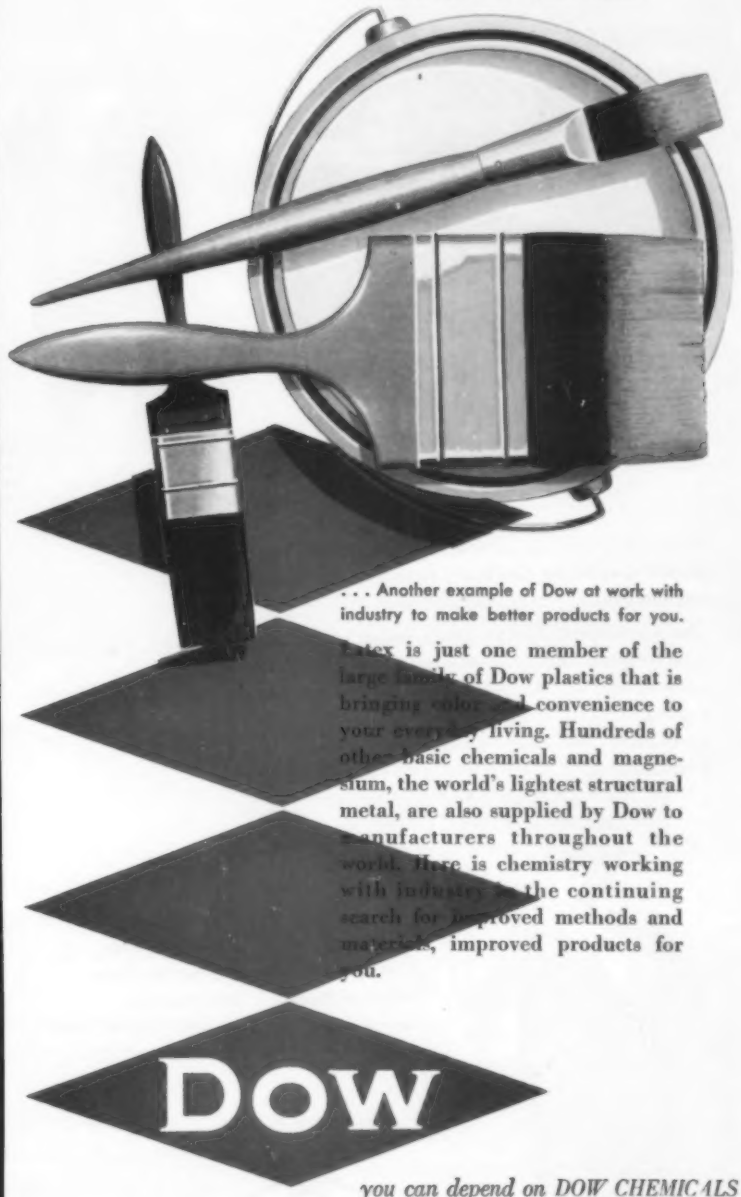
Molds Large Plastic Parts

Designed for production of large parts such as refrigerator liners, a new plastics injection-molding machine has also been profitably applied to the production of smaller parts.

Model 3000-P-400 injection machine completes a dry cycle in 22 seconds. It closes the mold and develops full clamp pressure of 3,000 tons in 6 seconds. Capacity of the new machine is 400 ounces. It molds polystyrene, cellulose acetate, cellulose acetate butyrate, and acrylics. **(The Hydraulic Press Manufacturing Co., Mount Gilead, Ohio.)**

LATEX

Painting is easy now. Paints made with Dow Latex are easy to apply, fast drying, have no paint odor. They dry to a tough, scrubbable finish, yet rinse out of brush or roller with plain water.



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NEW PRODUCT BRIEFS

Remote Handling Device—Master Slave Manipulator, model No. 8, has a wrist action that practically duplicates human-wrist motion. It allows the operator to perform highly complex radioactive-cell operations with relative ease and complete safety. The manipulator handles weights up to 30 pounds. **(American Machine & Foundry Co., 261 Madison Ave., New York 16, N. Y.)**

●

Checks Surface Roughness—Hand-held surface comparator has a standard surface-roughness scale inserted at the end of the instrument. Operator holds work to be examined up to instrument and sees surface against scale under ten-power magnification. **(Bausch & Lomb Optical Co., 625 Paul St., Rochester, N. Y.)**

●

Crawler Tractor, Scraper—Model C-6 crawler tractor in effect is a half-section of its big brother, the TC-12, which is powered by two 6-71 Detroit Diesel engines; the C-6 employes a single engine. The S-12 scraper is a 12-yard struck-capacity, self-propelled rubber-tired scraper of the overhung-engine type. **(Euclid Div., General Motors Corp., Cleveland 17, Ohio)**

●

Reagents—To speed settling and filtration, Aerofloc reagents agglomerate finely-divided particles in suspensions. Developed for the mining industry, these synthetic polymers should find use in water and waste treatment where agglomeration of colloidal material and organic slimes increase effective capacity of filters. **(American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.)**

●

All-purpose Welder—RMC-4J AC/DC single-phase welder is fan-cooled and designed for light fabrication welding. The welder affords a continuous current range, full overload protection, and portability. It is 36 inches high and weighs 200 pounds. **(Westinghouse Electric International Corp., 40 Wall St., New York 5, N. Y.)**

It takes a world of products to make a ton of Bethlehem steel. In fact, Bethlehem is a customer of *41 countries* around the globe.

In this world market, Bethlehem buys chrome, tin, tungsten, manganese, fluorspar, hemp, rubber, paper pulp and chemicals—to go into the steel itself or to be used in plant operations.

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984-foot Eiffel Tower — world's third tallest structure — raises its 100-passenger elevators with hydraulic power generated by 15 Worthington Power Pumps (right).

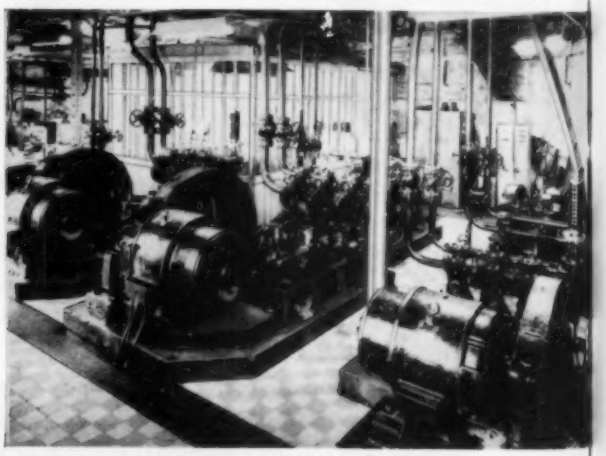
Whose pumps would you expect to find in the Eiffel Tower?

If you said "Worthington's", you know your pumps.

The ones we're talking about power the Eiffel Tower's 100-passenger hydraulic elevators. The original U.S.-built, steam-driven Worthingtons went in back in 1889 when the Tower was built. Since 1900, however, Worthington's Le Bourget plant has supplied pumps for the structure. The most recent additions, modern electric-drive Worthington pumps, moved into the Tower pump room just last year.

Worthington products also live up to expectations in the Americas, Italy, Germany, Spain, Japan — wherever men need top-notch equipment to turn their blueprints into reality. The reason? With offices, plants and service facilities throughout the world, Worthington's famous wings have been world travelers for more than a century. And the products that wear them have earned a reputation for delivering reliable performance when the chips are down.

That's why you'll see the name *Worthington* on so many specifications for pumps, compressors, air-conditioning equipment, turbine-generators, construction equipment and other industrial products. That name on your specifications will make your job easier, too. Worthington Corporation, Export Dept., Harrison, N. J., U.S.A. 56-5E



WORTHINGTON

The Sign of Value Around the World

▶ YOUR MANAGEMENT READING

Management Digest's editorial staff here again does the "worthwhile reading" for you to save your time. For the following literature, please write directly to the addresses given.

Our Smallest Servants—That is the name of the first popular book on fermentation chemistry—one of the most momentous and far-reaching of all scientific achievements. It's the ability to harness microscopic living creatures to the service of mankind. (Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.)

Colloidal Dispersions—You can use "dag" dispersions as maintenance and operational lubricants, in manufactured products, as production lubricants. Uses run into the hundreds. Ask for bulletin 500. (Acheson Colloids Co., Port Huron, Mich.)

To Improve Record Handling—Case study, form SL-0953-009, tells how one company saved over $10,000 a year with motorized files and wrote off the equipment cost in 16 weeks. (Diebold, Inc., Canton 2, Ohio.)

Hydraulic Booms—Construction and mining executives will find form 4162 packed with useful information on Hydra-boom applications and their advantages over wagon drills and column-mounted drills. (Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.)

Where Railroads End—That is where off-road transportation begins. "New Horizons in Off-Road Transportation" tells the story of LeTourneau Cross-Country Freighters for use in rough country, jungles, or deserts. (R. G. LeTourneau, Inc., Longview, Texas.)

When Carbide Tools Fail—Bulletin C-102 suggests you try Deloro Stellite 100 for applications unsuitable for carbides. It is tough, does not have to be favored with light feeds, does not work-harden the metal being cut, is quickly resharpened with standard wheels, and is less expensive than carbide. (Deloro Smelting & Refining Co., Deloro, Canada.)

U.S. Capital-Goods Market—A 10-year forecast predicts a rise from the present $32-billion to $48.4-billion. Its meaning to you: a bigger market for exported equipment. Ask for Capital Goods Review, No. 24. (Machinery and Allied Products Institute, 1200 Eighteenth St., N. W., Washington 6, D. C.

Packaging Multiform Products—Fanfold booklet introduces Fanfold, a continuous sheet for custom packaging products of varied shapes and sizes. (National Container Corp., 7 Central Park West, New York 23, N. Y.)

Developments in Mylar—Polyester film is finding new uses every day. Booklet A-682 tells you about the latest. (E. I. du Pont de Nemours & Co., Wilmington 98, Del.)

Developing Your Executive Skills—In this book, Auren Uris gives practical advice to the executive faced with the problem of running a business, working with people, improving his own efficiency. Price is $4.50. (McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y.)

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Getting stuff aboard or off of a ship can be a tough job if you insist on doing it the hard way. But you'll find a lot of your troubles melt away when you ship through Newport News, Virginia.

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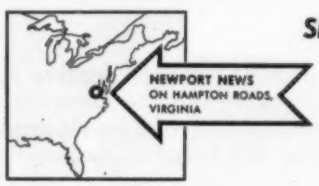

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The Publisher Says . . .

How often do you travel abroad?

If you are like most readers of MANAGEMENT DIGEST, you do it several times a year . . . to visit branch plants, to talk with customers, to visit new markets. People in the publishing business do this kind of traveling, too—I have just returned myself from Latin America, where I had the opportunity of talking with MANAGEMENT DIGEST readers.

Another important reason for traveling is to visit exhibitions, trade fairs, and expositions. Here you have two opportunities: you can see new equipment and materials that will help you in your business, and you can see the techniques other manufacturers use to sell their products.

One of these important shows will be held next year in Chicago, U.S.A. It is the American Road Builders' Association Road Show—the first one since 1948—and it will be held in the Chicago Ampitheatre, January 28-February 2, 1957. Modern machinery to build tomorrow's roads will be displayed in an auditorium with over 300,000 square feet of space. Representatives of more than 50 nations will attend. If you would like to attend, I suggest you start action now—write to: American Road Builders' Association, World Center Building, 918 Sixteenth Street, N. W., Washington 6, D. C., U.S.A.

And speaking of my own travel, I am glad to report that our readers to whom I talked are very enthusiastic about the magazine. I hope that you will let me have your opinion, too.

Charles S. Mill

Charles S. Mill
Publisher

ADVERTISERS IN THIS ISSUE

AIR EXPRESS INTERNATIONAL CORP.... 52
ALLEN BUSINESS MACHINES, INC., R. C. 33
ALLGEMEINE ELEKTRICITATS-GESELLSCHAFT 5
ALLIS-CHALMERS MANUFACTURING CO., General Machinery Division..... 1
AMERICAN AIR FILTER CO., INC..... 30
AMERICAN BLOWER CORP..... 41
ANDERSON COMPANY, V. D..... 47
BETHLEHEM STEEL EXPORT CORP..... 55
BUNDY TUBING COMPANY.....3rd Cover
BURROUGHS CORPORATION.....4th Cover
CHESAPEAKE & OHIO RAILWAY..... 58
CIMEX FRASER TUSON LTD..... 36
CLEMSON BROS., INC..... 30
CORNING GLASS WORKS..... 2
DAILY MAIL IDEAL HOME EXHIBITION.. 51
DoALL COMPANY..... 8
DOW CHEMICAL INTL. LTD..... 53
EX-CELL-O CORPORATION..... 49
FORD MOTOR CO., LTD..... 31
GENERAL MOTORS OVERSEAS OPERATIONS .....2nd Cover
GLOBE HOIST COMPANY..... 37
HITACHI, LTD..... 4
KLOCKNER-HUMBOLDT-DEUTZ AG., KOLN 10
LINK-BELT COMPANY..... 32
NATIONAL BROACH & MACHINE CO... 9
NORDBERG MANUFACTURING CO..... 29
REMINGTON RAND INC..... 44
SHAWINIGAN CHEMICALS LTD..... 54
STURTEVANT MILL COMPANY..... 25
UNION CARBIDE INT'L. COMPANY..... 50
WILLYS-OVERLAND EXPORT CORP..... 60
WORTHINGTON CORPORATION..... 56
YODER COMPANY..... 6

CONSULTING SERVICES 52

This index is a service to readers. Every effort is made to maintain its accuracy, but MANAGEMENT DIGEST assumes no responsibility for errors or omissions.

Publications Digested

McGraw-Hill Publishing Co., Inc.
330 W. 42nd St., New York 36, N. Y.

American Letter
American Machinist
Aviation Week
Business Education World
Business Week
Bus Transportation
Chemical Engineering
Chemical Week
Coal Age
Construction Methods & Equipment
Control Engineering
Electrical Construction & Maintenance
Electrical Merchandising
Electrical West
Electrical Wholesaling
Electrical World
Electronics
Engineering & Mining Journal
E&MJ Metal & Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Fleet Owner
Food Engineering
Industrial Distribution
Ingeniería Internacional Construccion
Ingeniería Internacional Industria
Metalworking Production (London)
National Petroleum News
Nucleonics
Petroleum Processing
Petroleum Week
Power
Product Engineering
Textile World
The American Automobile (Overseas Edition)
Today's Secretary

Advertising Publications, Inc.
200 E. Illinois St., Chicago 11, Ill.
Industrial Marketing

American Bankers Association
12 E. 36th St., New York 16, N. Y.
Banking

American Management Association
330 W. 42nd St., New York 36, N. Y.
Personnel

American Society for Metals
7301 Euclid Ave., Cleveland 3, Ohio
Metal Progress

Bill Brothers Publishing Corp.
386 Fourth Ave., New York 16, N. Y.
Sales Management

Breskin Publications
575 Madison Ave., New York 22, N. Y.
Modern Packaging, Modern Plastics

Dartnell Publications, Inc.
4660 Ravenswood Ave., Chicago 40, Ill.
American Business

F. W. Dodge Corp.
191 W. 40th St., New York 18, N. Y.
Architectural Record

The Economist Newspaper, Ltd.,
22 Ryder St., London S.W. 1
The Economist (London)

Fritz Publications, Inc.
431 S. Dearborn St., Chicago 5, Ill.
The Paper Industry

Harvard University
Soldiers Field, Boston 63, Mass.
Harvard Business Review

Industrial Publications, Inc.
5 South Wabash Ave., Chicago 3, Ill.
Ceramic Industry

Keeney Publishing Co.
6 N. Michigan Ave., Chicago 2, Ill.
Heating, Piping & Air Conditioning

Petroleum Publishing Co.
211 S. Cheyenne Ave., Tulsa 1, Okla.
The Oil and Gas Journal

Printers' Ink Publishing Co., Inc.
205 E. 42nd St., New York 17, N. Y.
Printers' Ink

Simmons-Boardman Publishing Corp.
30 Church St., New York 17, N. Y.
American Builder, Marine Engineering, Railway Age, Railway Track and Structures, Railway Locomotive and Cars, Railway Signaling & Communications

Temple Press Ltd.
Bowling Green Lane, London E. C. 1
Plastics, The British Motor Ship

The Times Publishing Co. Ltd.
Printing House Square, London, E. C. 4
The Times Review of Industry

Welding Engineer Publications, Inc.
12 East Grand Ave., Chicago 11, Ill.
Welding Engineer

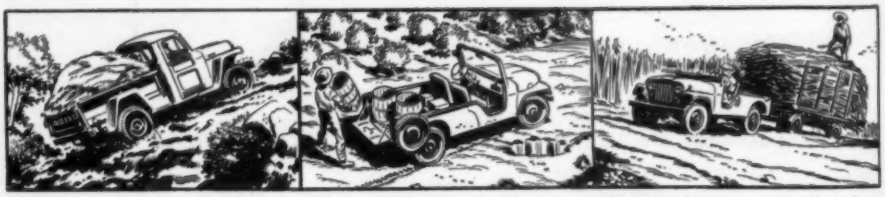
'Jeep' vehicles GO where others can't!

In countries around the world, the word 'Jeep' has come to mean dependable, go-anywhere transportation... transportation on and off the road, in any weather, the year 'round.

On those occasions when the vehicle must go off the road, or in those locations where good roads are non-existent, 'Jeep' vehicles save time, effort and expense. Only a flick of a lever enables you to shift from regular 2-wheel drive for highway use into 4-wheel drive for extra traction to take the fully loaded vehicle up a 60% grade.

If you need rugged transportation of men and cargo, you will find the versatility and power of 4-wheel-drive 'Jeep' vehicles the answer to your problems.

Your local Willys dealer is ready to demonstrate 'Jeep' 4-Wheel-Drive vehicles to you.



The 'Jeep' Truck meets the need for versatile cargo transport, hauls loads of more than a ton — on or off the road, in any weather.

New model CJ-6 'Jeep' gives a choice of 'Jeep' models. The new CJ-6 gives you 50% more cargo area, up to 1,500 pounds payload.

Hauling heavy cargo is all in the day's work for the versatile Universal 'Jeep'. With power take-off, it operates many types of equipment.

Willys-Overland Export Corporation, *Toledo 1, Ohio, U.S.A.*

Bundy simplifies oiler-tube design, cuts fabrication time, trims costs

Another example showing how Bundy engineers help solve customers' design headaches

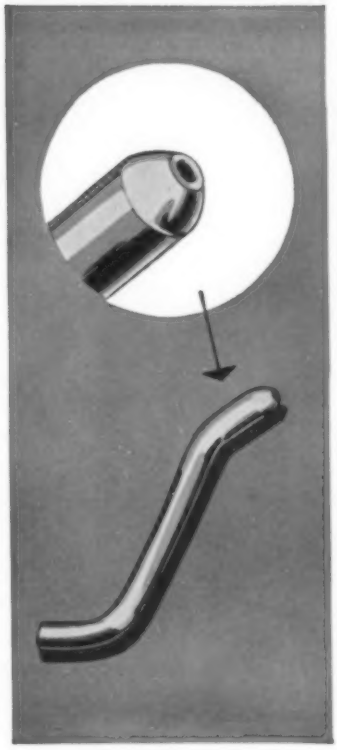
Naturally, doing everything we can to meet our customers' design specifications is a Bundy *must*. But sometimes our engineers—with their years of problem-solving experience—see ways in which original specifications can be improved. These improvements usually result in substantial savings to the customer, as in the example shown at right.

Doing just a little more than the job requires is an old habit with us here at Bundy. That's why you'll find it so rewarding to deal with us at the design stage of a new product.

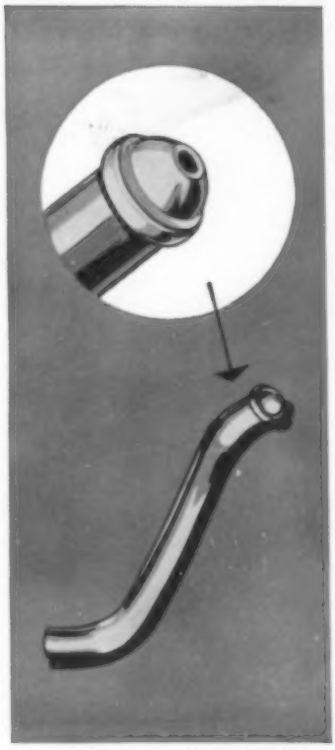
Why not profit from an unbeatable combination: expert Bundy engineering services plus the priceless extra of Bundyweld Tubing—the only tubing double-walled from a single metal strip, copper-bonded through 360 degrees of double-walled contact. Bundyweld is leakproof; thinner-walled yet stronger; has high thermal conductivity; has high bursting strength. The safety standard of the refrigeration industry, Bundyweld *is used in 95% of today's cars, in an average of 20 applications each.*

Let Bundy help you with your tubing design problem. Call, write, or wire us today.

BUNDY TUBING COMPANY
DETROIT 14, MICHIGAN



Problem: This 3/16" O.D. timing-gear oiler tube, shown above, required a tapered end for a nozzle effect. As specified by the customer, it required numerous swaging operations. Bundy engineers, always on the lookout for new ways to shave costs, hit upon the ingenious solution shown at right. With the customer's consent, original specifications were changed.



Solution: First, Bundy added upset to nozzle tip (see above). As a result, nozzle-forming operations were cut in half. But Bundy innovations didn't stop here; next, two hand-bending operations were incorporated into one automatic press operation. The over-all result: impressive fabrication savings to the customer, with no compromise in tubing function.

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness,

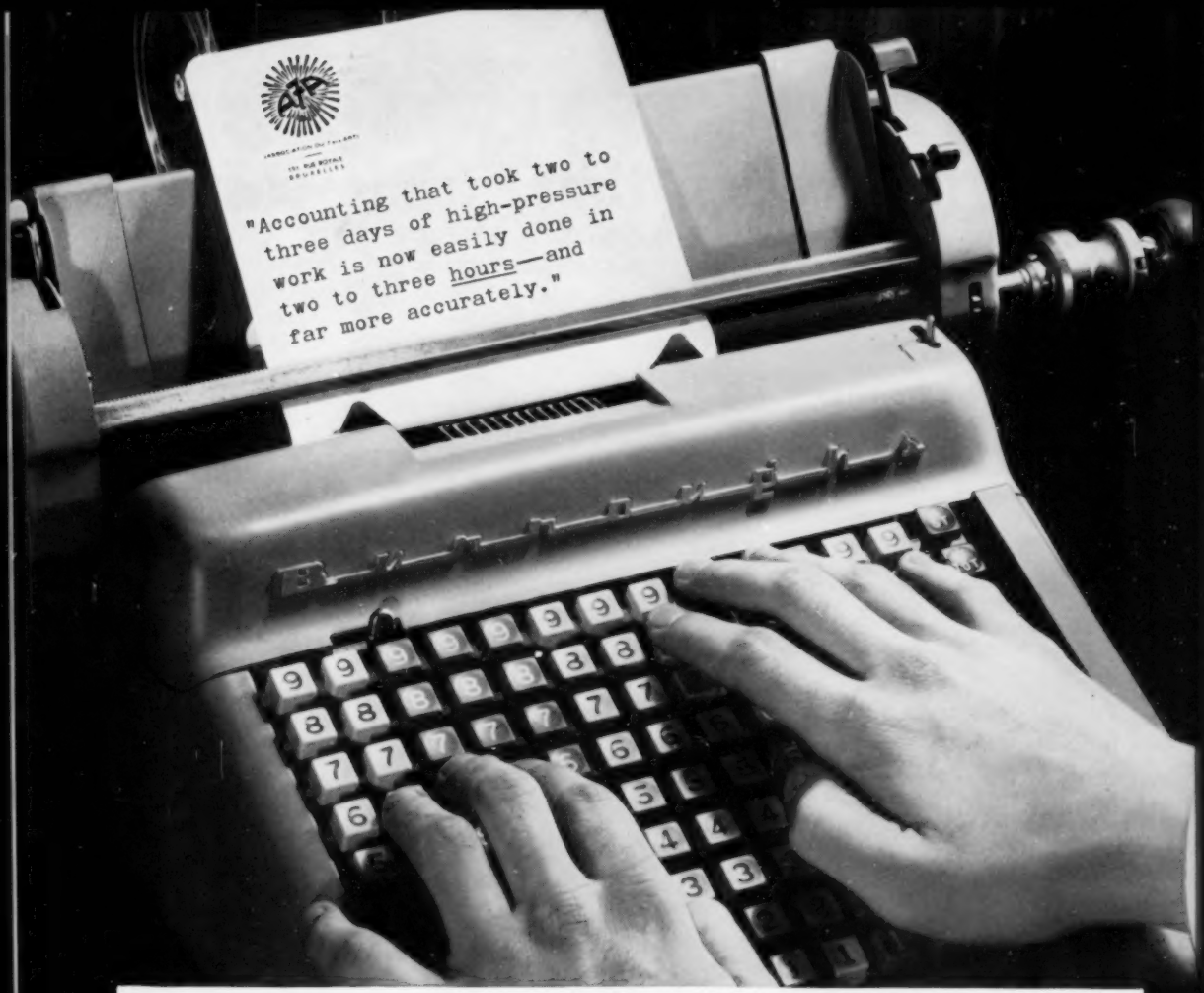
and passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

Sizes up to 5/8" O.D.
Leakproof
High thermal conductivity
High bursting point
High endurance limit
Extra-strong
Ductile
Lightweight
Machines easily
Takes plastic coating
Takes plating
Shock-resistant
No inside bead
Uniform I.D., O.D.


"Accounting that took two to three days of high-pressure work is now easily done in two to three hours—and far more accurately."

The solution found by the Association du 7ème Art may help you.

Movie firm writes happy ending —with a figuring machine!

The Association du 7ème Art in Brussels obtains motion picture films from distributors and rents them to theaters. This seemingly simple transaction involves a great deal of paperwork. Since deadlines are strict, long hours of overtime work were often necessary. The resulting fatigue increased the danger of error.

Mr. L. Martens, Director of the Association, called in the Burroughs man. He recommended a system built around a Burroughs adding and subtracting machine.

Results. The new machine does all the figurework and prints the results directly on the vouchers. Jobs which required two to three days of intense work are easily completed in two to three hours. And the risk of error has been virtually eliminated.

Can your business profit from faster facts? Your local Burroughs man offers experienced advice on modern business machine methods, complete service. For his address, write: Burroughs Corporation, Detroit 32, Michigan, U.S.A.

"Our Burroughs machine is paying for itself," says Mr. L. Martens of the Association du 7ème Art (left) to Mr. S. Membré, the Burroughs man.

Call in your local Burroughs man